

Handbook of the German Army in War, November, 1918, etc. [With maps.] Title

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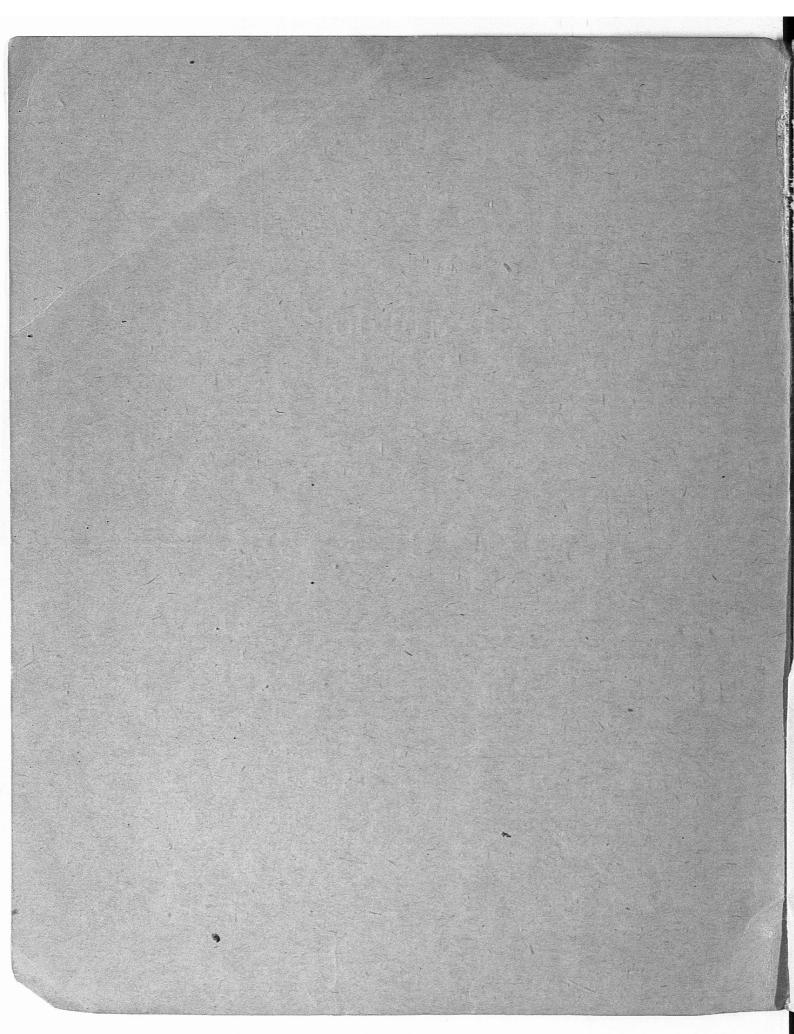
HANDBOOK

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GERMAN ARMY IN WAR. NOVEMBER, 1918.

ISSUED BY THE GENERAL STAFF.

NOTE.—In order to avoid extensive alterations, which would have amounted, in effect, to the "Handbook" being rewritten, the present edition has been assumed to refer to the period immediately preceding the armistice of the 11th November, 1918. The present tense has, therefore, been retained throughout the book.



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HANDBOOK OF THE GERMAN ARMY IN WAR. NOVEMBER, 1918.

CHAPTER I.

RECRUITING AND RECRUIT TRAINING.

1. Liability to serve.—In peace, every male German was liable to military service

(wehrpflichtig) from his 17th to his 45th birthday.

Although not liable in peace to service in the standing army until his 20th year, every German, on reaching the age of 17, automatically became liable to serve in the *Landsturm*, i.e., the category intended primarily for home defence. Every man belonged to the *Landsturm* 1st Ban between the ages of 17 and 20.

2. Recruiting in peace.—In peace, liability to service in the standing army commenced when a man had reached the age of 20, and consisted of 2 years' "aktiv" colour-service (3 years in the cavalry and horse artillery), followed by successive periods in the Reserve (4 or 5 years), Landwehr (11 years), and Landsturm 2nd Ban (7 years). All men passed to the Landsturm 2nd Ban on the 1st of April in the year in which they reached the age of 39.

After completing his period of colour-service, a man was, in peace, liable to be called out for two annual trainings while in the Reserve, and after passing to the

Landwehr 2nd Ban was free from further service.

3. Annual enrolment.—The annual recruit contingent, or "class," comprises all men who attain their 20th birthday during the year in question. Thus, the men of the 1900 "Jahrgang" form the 1920 Class (Jahresklasse).

1900 "Jahrgang" form the 1920 Class (Jahresklasse).

In peace the preliminary enrolment or mustering (Musterung) of the annual recruit contingent took place in the spring of each year. At this muster the following different

categories came up for medical examination:

- (a.) All men who would attain their 20th birthday in that particular year.
- (b.) "Restanten"* from the two previous years.
- (c.) A few older men who for special reasons had been allowed to postpone their service.

^{*} i.e., men who for any reason are not taken for any form of service, but are put back for one or more years.

(d.) Younger men who had been allowed to come up before their normal time; i.e., chiefly men who wished to adopt the army as their profession.

The final classification and disposal of the above categories in the three years preceding the war were as under:—

Number of men called up for examination by the <i>Ersatzkommission</i> .	Posted to the Landsturm.	To the Ersatz Reserve.	Annual contingent of recruits for colour service.	Number finally disposed of, in- clusive of Naval contingent and final rejections.	Annual balance (Restanten)
1911, 20 years old 563,024 21 ,, 367,688 22 ,, 289,098 Older and younger 51,574	16,680 13,925 102,821 8,881	6,141 4,817 77,486 3,699	106,249 53,185 62,510 1,981	565,520 (including volunteers).	705,864
Total 1,271,384	142,307	92,143	223,925	,	W -
1912, 20 years old 557,608 21 ,, 385,163 22 ,, 294,825 Older and younger 52,272 Total 1,289,868	15,022 12,366 101,475 9,059 137,922	5,969 4,621 73,243 3,873 87,706	112,624 57,757 67,261 2,075	572,168 (including volunteers).	717,700
.913, 20 years old 587,888 21 , 380,331 22 , 305,619 Older and younger 54,181	12,825 10,371 87,189 7,915	5,521 4,439 73,064 3,887	125,001 80,767 97,371 2,536	622,360 (including volunteers).	705,659
Total . 1,328,019	118,300	86,911	305,675		

Notes.—(1.) The increase in the annual contingent for 1913 was due to the passing of the Friedens-präsenzstärkegesetz (Peace-strength law) of 1912, which provided for an increase in the strength of the standing army. This increase was to have been fully effected by October, 1915, had not war broken out.

(2.) The bulk of the men posted to the Ersatz Reserve and to Landsturm I are those who have come up for the third and last time, i.e., who are 22 years old.

Men on the Restanten-Liste, after having been put back at three successive musters, were finally released from their obligation to serve and posted to the Untrained Landsturm. The actual calling of the annual class, i.e., its assembly in the depôts, took place on the 1st October in each year.

For the years 1914—1919 a gross total of 650,000 may be assumed for each annual class, before the elimination of the unfits. Actually, during the war, the net figures for the various classes have only averaged between 400,000 and 500,000 men each year. The

^(3.) Rejected men are said to be ausgemustert (mustered out). They are not liable to any form of military service. The percentage of absolute rejections on account of total physical incapacity for service (classified as Dauernd-untaugliche) amounts to about five to six per cent. of the total number of men examined at the annual muster. This is not shown above.

reduction in the net figures has been due partly to the number of men who anticipated their calling up by volunteering, partly to the physical deficiency of men called up before their time, and partly to the necessity of retaining men in skilled occupations.

4. The Ersatz* Reserve.—In peace, the annual contingent necessary to maintain the Army and Navy was about 240,000 men in 1912, but had risen to 305,000 in 1913 for the Army alone, owing to the passing of the Peace Strength Law of 1912.

As the annual class was greatly in excess of this figure, even after the weeding out of the unfits, a certain number of men (87,000 in 1912) were turned over each year to the

Ersatz-Reserve (Supplementary Reserve). The Ersatz Reserve was made up of—

(a.) Men fit for active service, but excused for family or economic reasons, and

(b.) Men with minor physical defects.

These men nominally remained in the Ersatz Reserve for 12 years, during which time they were liable to be called up for three annual trainings. Only a small proportion of the Ersatz Reserve underwent training.

After passing 12 years in the Ersatz Reserve, the trained men were transferred to the Landwehr 2nd Ban, while the untrained men were transferred to the Landsturm 1st Ban.

On mobilization, the Ersatz Reserve amounted to a total of about one million men,

aged between 20 and 32.

As regards the employment of the Ersatz Reserve in war, it should be borne in mind that men of this category have not necessarily been incorporated in Ersatz formations; for instance, a very high percentage of Ersatz Reservists filled the ranks of the first series of new formation Reserve divisions in 1914. Conversely the "brigade Ersatz battalions" in the original Ersatz divisions contained a majority of reservists and Landwehr men.

5. One-year volunteers.—In peace, young men of good education who undertook to clothe, feed and equip themselves during their period of service, and who attained a satisfactory standard of proficiency in their duties, were permitted to transfer to the Reserve as "aspirant officers" at the end of one year's service only. After undergoing two annual trainings with the Reserve, and passing a military examination, they were graded as Reserve Officers.

These men were known as "one-year volunteers" (Einjährig-freiwillige), and wore an edging of twisted cord of the State colours on their shoulder straps as a distinguishing

mark.

6. Categories.—The following diagram shows the different classes forming the categories, trained and untrained, which were liable for service in July, 1914, and also the annual classes which have become liable for service since that time. Men of all the

^{*} Care should be taken to avoid confusing the various meanings of the word "Ersatz." In its original sense it means "Supplement" or "Reinforcement." It was applied to the pre-war recruiting category "Ersatz-Reserve" in this sense, and was also used to denote the depôt units in Germany. The word Ersatz is also prefixed to a certain number of field units (regiments, brigades and divisions) which have been formed by the depôts during the war.

undermentioned classes and categories were serving in the German field army by November, 1918:—

Year of birth.	Forming the class of	Men fit for service.	Men fit for service, but not required.	Men unfit for war service.
1900 1899 1898 1897 1896 1895 1894	1920 1919 1918 1917 1916 1915	$\left. \begin{array}{c} \\ \\ \end{array} \right\}$ Landsturm,	1st Ban.	
1893 1892 1891 1890 1889 1888 1887	1913 1912 1911 1910 1909 1908 1907	Active*	Ersatz Reserve (only a small number trained).	Landsturm, 1st Ban (untrained).
1886 1885 1884 1883 1882	1906 1905 1904 1903 1902	Landwehr, 1st Ban,		
880 879 878 877 876	1900 1899 1898 1897 1896	Landwehr, 2nd Ban.	Trained men in Landwehr, 2nd Ban. Untrained men in Landsturm, 1st Ban.	
875 874 873 872 871 870 869	1895 1894 1893 1892 1891 1890 1889	Landsturm,	2nd Ban.	Landsturm, 2nd Baj

^{*} The term "Active," "Reserve," &c., denotes the category in which a man was classified on mobilization in 1914.

⁶A. Men available for service 1914 to 1918.—A chart showing the number of men in Germany available for military service from 1914 to 1918, also the number called up and how they were distributed, is given on Plate 36, at the end of the book.

7. Recruiting in war.—In war, the period of liability to be called up for military service is, as in peace time, between the ages of 17 and 45, with the following differences:—

(a.) The annual classes can be called up and sent to the front before reaching the

age of 20.

(b.) All transfers from one category to another (i.e., from Active to Reserve, from Reserve to Landwehr, and from Landwehr to Landsturm) are suspended, except in a few cases of men who have been incapacitated by wounds or sickness, and are on that account definitely transferred to the Landsturm.

(c.) Men are not released from service on reaching the age of 45.

(d.) Men previously rejected as "permanently unfit" can be re-examined and called upon to serve. (Law of 9th September, 1915.)

In war, the enlistment of the recruits of a new class involves three distinct processes:—

(a.) Inscription on the Landsturm Lists (Meldung zur Stammrolle), which takes place from time to time in each recruiting district (Aushebungsbezirk) for all youths who have reached the age of 17.

(b.) Medical inspection (Musterung), when the men of the annual class in each district are assembled, medically examined and classified according to their

fitness or otherwise for service.

(c.) Calling up (*Einziehung*) for active service, when the reservists are actually incorporated in the standing army and join a depôt.

At the medical inspection the recruits are classified as follows:—

- (a.) K.V.—Kriegsverwendungsfähige (= fit for active service).
- (b.) G.V.—Garnisonsverwendungsfähige (= fit for garrison duty in Germany, on the Lines of Communication, or in the field).
- (c.) A.V.—Arbeitsverwendungsfähige (= fit for labour employment).
- (d.) D.U.—Dauernd-untaugliche (= permanently unfit).

When a class is called up, the K.V. men are at once sent to the depôts of field units; the G.V. and A.V. men are sent to Landsturm formations (see Chapter XVI). The "Dauernd-untaugliche," although temporarily exempted, are always liable to be reexamined; if then considered fit they are posted to a depôt.

After the medical inspection, and before being called up for service, a recruit engaged on an essential trade may be exempted on the application of his employer ("reklamiert").

These men have been combed out from time to time during the war.

8. War volunteers.—During the war a certain number of young men, between the ages of 17 and 20, have been allowed to volunteer for active service before the calling up

of their class. These men are known as war volunteers (Kriegsfreiwillige).

In 1914, volunteers came forward in very large numbers and included a fair percentage of men, over 20 years of age, who had been posted to the untrained Landsturm, and were thus released from their obligation to serve in peace. In 1915 there was a marked falling off, and from that time onwards it may be estimated that about 5 per cent. of each class has anticipated its calling up by volunteering.

9. Stages of recruiting during the war.—The following diagram shows the stages of recruiting since the beginning of the war.

The length of the black lines shows the number of men raised from each class or category; the slope of the black lines denotes the duration of calling up in each case.

200000 400000 600000 800000 1000000 1200000 1400000					/-	1919 Claiss	- Western Front	Maintained by	Combed Men from Onath's from Russia	Munifion Factories	1919 Class (Balance)				74.			/920 Class		. Cambed Men from Drafts to Fighting Units		July 1 of 1	& Technical Titobs			
0	January	February	March	April	May	o June	L July 5	August	September	actiober	November	December	donuary	February	March	April	May	6 June	8 dulu		١.	October	Wovember	Oscomber	* 15 · 10 · 10 · 10 · 10 · 10 · 10 · 10 ·	
											•	700												1		
	00000	Sarve ndwehr II	П	-					- 1		andstyrm 1-35	Illued Lands/um				·							,	•	T	
A	1,000,000 1,200,000 1,400,000	Land Dangle !!	-		Frsatz Reserve		was frequillige & Rostanten				Landstyrm 1-35	Incamed Lands/um	X		ă.			rm II.	Slass.			Jan & Sept. 1897			000,000	תבר ומאו
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	600,000 800,000 1,000,000	-	The state of the s		Frsatz Raserve		19 Mallachtringe Tropuillige & Rostanten	-/			/- 	1915/Class		Landshum 1-30		- 1918 Class	gricustarists)	Untrained Landsturm II.	Permanently Unfit-Class.			V7 Class barn between Jan & Sept. 1897	d Men from		 s born battingen Oct & Dec 1887	
Aut - A 2/4 ()	800,000 1,000,000	-	Spithology	Quiber .	Korenbo	Jecember	Sanuary 19 MC Lack frances From Illiged Restanten	Tebruan	March		/- /			August Landshum 1439	September	October Combed 1918 Class	Morenbe (Agriculturists)	December Unitrained Landsturm II.	January Permanantity Unfit Class.	Текнету		1907 Class born between an & Sept. 1897,	Combed Men from			1917 Class born between Ochs Dec 1887

The Reserve and Landwehr were practically all absorbed by the expansion of the

Army which took place on or shortly after mobilization.

The Ersatz Reserve began to come into the depôts in considerable numbers in September, 1914, when it contributed towards the first series of "new formation Reserve divisions." The rest of this category was called up during 1915.

The 1914 Class was called up about the time when it was normally due (end of September, 1914), together with the *Restanten* of the 1914 muster, and a certain number of war volunteers. The total number of men thus produced was probably over a million. The calling up of these men was spread over a period of 3 months, as the depôts were full of Ersatz reservists. They were sent to the front after 3 or 4 months' training, and, in addition to providing drafts for existing units, they helped in the creation of the second series of new formation Reserve divisions numbered 75-82 and 8th Bavarian.

The Landsturm was then extensively drawn on to make good the losses of the winter campaign, and the Landsturm classes, called up in successive batches, continued to

supply drafts until the close of 1915, when the last of the 2nd Ban was exhausted.

Meanwhile, the 1915 Class had been called up during the months of April, May and June, 1915, followed by the 1916 Class between August and November of the same year. The 1915 Class was sent to the front after 4 months' training, the 1916 Class after an average of 4 to 5 months' training.

The heavy fighting of the summer and autumn of 1915 had proved such a drain on Germany's man-power that drastic measures had to be adopted in the autumn of that

year to tap fresh resources.

The men who had been previously rejected as "permanently unfit" for service were re-examined under more stringent conditions. As this source provided only indifferent material, the next resort was to "comb out" labour, first agricultural, and finally industrial. Even munition factories were called upon to provide their quota.

The 1917 Class was called up between January and May, 1916, i.e., over 18 months in advance of its normal time. This class was rapidly exhausted owing to the heavy losses at Verdun and on the Somme. Part of the 1917 Class was sent to the front after

only 3 months' training.

The calling up of the 1918 Class took place between September, 1916, and January, 1917, 2 years before it was due. The first recruits of this class were posted to field units in January, and the class was exhausted as a source of drafts by the end of July, 1917. It contributed to a large extent towards the formation of the new infantry regiments numbered from 442 onwards (231st to 242nd and 15th Bavarian Divisions).

Elements of the 1919 Class were called up in some parts of Germany during January and February, 1917, the bulk of the class being called up during May and June, 1917, $2\frac{1}{2}$ years before it was due. A number of the class—about 20 per cent.—were not, however, called up until October-November, 1917.

Drafts of the 1919 Class were sent to units and depôts in Russia between October, 1917, and February, 1918, to replace the large number of men transferred to the Western Front during this period. In April, 1918, the 1919 Class began to supply drafts to the front line units on the Western Front, and, by the end of August, the class was exhausted.

The 1920 Class, which was called up between April and June, 1918, i.e., $2\frac{1}{2}$ years before it was due, was drafted to the field recruit depôts during September-October With the exception, however, of a few weak drafts sent to the front line units during September and October, the 1920 Class did not supply reinforcements before the cessation The disbanding of formations and the transfer of men from Lines of of hostilities.

Communication and from technical units behind the front enabled the drafts from August to November, 1918, to be more or less maintained without the employment of the 1920 Class.

A few men of the 1921 Class, who were serving in the Auxiliary Service (*Hilfsdienst*) in occupied territory, were called up for military service during 1918, on reaching the age of 17 years. Except for these, no steps were taken to incorporate the 1921 Class in the Army during 1918.

10. Territorial recruiting organization.—The German recruiting system is based on the territorial organization of the Empire; the Army Corps is the unit for

purposes of recruiting and administration.

The German Empire is divided into 24 Army Corps Districts, in each of which a complete Army Corps is, in peace, stationed and recruited, except in the case of the XV, XVI and part of the XXI Army Corps, stationed in Alsace-Lorraine, which are partially recruited from other districts of the Empire. The Prussian Guard Corps was stationed in Berlin in peace, but was recruited from the whole of Prussia and from Alsace-Lorraine.

In peace, each of these Army Corps Districts was divided into 4 or 5 brigade districts, each subdivided into 2 or 3 Landwehr districts (Landwehr-Bezirke); each Landwehr-Bezirk

had a small permanent staff for recruiting and mobilization.

In addition to these 4 or 5 brigade districts, there existed in the areas of certain large towns so-called *Landwehr-Inspektionen*, whose task it was to deal with the inevitable surplus of men in thickly populated areas.

11. The Army Corps Districts.—The 24 Army Corps Districts* are as follows:—

Army Corps.	Area.	Principal towns.
I	East Prussia	
· II	Pomerania	Stettin, Bromberg, Stralsund, Swinemunde.
III	Brandenburg	Berlin, Brandenburg, Frankfurt a/O., Potsdam.
IV	Prussian Saxony	Magdeburg, Halle a/S., Halberstadt, Torgau.
V	Duchy of Posen	Posen, Liegnitz, Görlitz, Glogau.
VI	Silesia	Breslau, Schweidnitz, Glatz, Gleiwitz, Neisse.
V II	Westphalia	Münster, Wesel, Düsseldorf, Crefeld.
VIII	Rhineland	Coblenz, Cöln, Aachen, Trier, Bonn, Düren.
IX	Schleswig-Holstein	Altena Tambana Duaman Tribout Flanchung
X	Hanover	Hannover, Braunschweig, Oldenburg, Osnabrück.
XΙ	Thuringia and Hesse-Nassau	0 -1 F C / C / L W T M
XII	Eastern Saxony	Dresden, Bautzen, Pirna, Zittau, Meissen.
XIII	Württemberg	Stuttgart, Ulm, Ludwigsburg, Tübingen.
XIV	Baden	Karlsruhe, Mannheim, Freiburg i/B., Heidelberg.
XV	Alsace	Strassburg, Colmar, Zabern, Neu-Breisach.
XVI	Western Lorraine	Metz. Diedenhofen, Saarlouis, St. Avold.
XVII	West Prussia	Daniel Considera Thom Manienwooder
XVIII	Hesse	Frankfurt, a/W., Mainz, Darmstadt, Worms.
XIX	Western Saxony	T
XX	South-east Prussia	ATI I I D have Tilking Tool Downer From
XXI	Eastern Lorraine.	Q 1 - 1 - 1 - 1 - Q h T - man - Dit - h
	Southern Bayaria	München Augsburg, Kempten, Passau.
	Lower Franconia and Palatinate	Würzburg, Bamberg, Zweibrücken, Landau.
	Northern Bavaria	True 1 True late of Domesanth Domesanth

^{*} See map at the end (Plate 1).

The towns printed in heavy type are the headquarters of Army Corps Districts.

In war, the headquarters of Army Corps Districts are known as stellvertretende Generalkommandos (acting Army Corps Headquarters).

12. Contingents furnished by the different States of the Empire.—Although organization, equipment and training are practically homogeneous throughout the whole of the German Army, the four Sovereign States have each their own army and separate Ministry of War. The Bavarian Army is the one which varies most from the Prussian model.

Officers of the Bavarian and Saxon Armies are on separate lists for promotion; officers of the Prussian and Württemberg armies are interchangeable.

The contingents furnished by the different States are fixed by law in the following ratio:—

Prussia and the Bavaria			A 100 PM	••	· • •	ini n	•••	Per cent 78
Saxony		••	ini ini Manakata		•••		••	$ \begin{array}{ccc} & 11 \\ & 7 \end{array} $
Württemberg	••			••	••	••	••	4
TT CONTRACTOR OF THE								100

This proportion has not altered during the war, and corresponds almost exactly to the relative populations of the four Sovereign States.

In peace, the Bavarian Army consisted of three Army Corps, namely, the I, II and III Bavarian Corps. Bavarian units, from Army Corps downwards, are numbered separately* from the units of the Prussian Army. Saxon and Württemberg units conform to the Prussian numerical series. The Saxon Army consisted in peace of two Army Corps, the XII and XIX, and the Württemberg Army of one, the XIII Corps.

The remaining States of the Empire do not furnish separate contingents, but are

merged in the Prussian Army.

Badensers and Alsace Lorrainers are mixed in the formations raised in the XIV Corps District. A certain number of Alsace-Lorrainers are to be found in the formations raised in the XIV, XV, XVI and XXI Corps Districts, but they are scattered for the most part in other units, and a large proportion is to be found in Guard units as well as in new formations raised in the Guard Corps depôts (e.g., 79th Reserve and 80th Reserve divisions). The XVI and XXI Corps (Lorraine) are principally recruited in Westphalia and Rhineland.

The Polish population of the Duchy of Posen is distributed over the Silesian and Vistula provinces (V, VI and XVII Corps Districts). There are also large colonies of Polish labourers in the mining and industrial regions of Westphalia and Rhineland, so that Poles are numerous in units recruited from the VII and VIII Corps Districts.

13. The depôt system.—In peace, each Army Corps District provided the machinery necessary for recruiting, equipping and training:—

2 infantry divisions, 2 cavalry brigades, and

The necessary proportion of technical troops.

^{*} There are a few exceptions amongst sector troops.

On mobilization, each infantry, cavalry and artillery regiment left behind at its peace station a depôt to provide it with reinforcements during the campaign. In the case of the different arms these depôts are known as follows:-

Ersatz-Bataillon For each infantry and foot artillery regiment, and for each Jäger and pioneer battalion.

Ersatz-Eskadron For each cavalry regiment. Ersatz-Abteilung For each field artillery regiment.

The majority of Active infantry regiments have two Ersatz battalions, but towards the end of 1917 the 2nd Ersatz battalion was disbanded in a number of cases.

In addition to supplying their affiliated field units with drafts, each of these depôts also

serves as a nucleus for the formation of new units.

The new units formed during or since mobilization are similarly provided with

Normally each depôt only provides drafts for its affiliated field unit, but on emergency it sometimes happens that men trained in the depôt of one regiment are sent as reinforcements to another regiment, occasionally even to a regiment belonging to another Corps district. Cases have occurred of regiments changing their depôt from one Corps district to another, e.g., the regiments of the 50th Reserve Division and 52nd Reserve Division.

14. Organization of regimental depôts.—In war time, each Active infantry regiment has normally two depôts (Ersatz battalions) situated at different places in its Corps district Reserve and Landwehr infantry regiments have usually only one depôt in Germany. battalion each.

A normal depôt battalion comprises—

3 or 4 Ersatz companies.

1 convalescent company (Genesende-Kompagnie or Genesungs-Kompagnie).

1 company of men fit for garrison duty (Garnisonsverwendungsfähige).

1 or 2 "recruit depôts" (Rekruten-Depots).

The strength and composition of depôt battalions vary from time to time according to recruiting requirements and the resources available, but the strength is usually from 1,000 to 1,200.

Untrained men on joining are posted to the "recruit depôt," which is, on an average, 400 strong and divided into 4 sections (Züge or Abteilungen). After a preliminary course of training the recruits are posted to the Ersatz companies, and are then ready to be sent as drafts to the field recruit depôts behind the front. The Ersatz companies are 100-200

In some cases recruits pass directly from the "recruit depôt" to the field recruit depôt, the Ersatz companies being filled with recovered wounded (Hergestellte) and combed

men who have already had some training.

The men of the "convalescent company" and "garrison duty company" are kept at light duty. Their progress is closely watched and they are subjected to frequent medical examinations. As soon as they are passed as fit they are transferred to the Ersatz companies.

The depôt battalions of Landwehr infantry regiments are organized in a similar manner, but they are made up of older men of a considerably lower physical standard.

15. Field recruit depôts.—Up to the spring of 1915, recruits enrolled in the German Army went direct from their regimental depôt in Germany to join their units at the front. The first order relating to the formation of field recruit depôts appears to have

been issued by the War Ministry on the 10th April, 1915. Since then, recruits of all categories, after a training varying in length from 1 to 3 months, have been sent to field recruit depôts (Feld-Rekruten-Depots) behind the front. The field recruit depôt is a kind of training camp where the recruits' training is completed; from these depôts the recruits are sent to the front as required. Returned wounded also pass through the field recruit depôts in order to learn the latest methods of trench fighting. During the later battles, recruits were often passed hurriedly through the field recruit depôts after only 2 or 3 weeks' training.

The field recruit depôts are generally attached to a division, or sometimes to a Corps, to which they act as an advanced reserve of personnel. Being situated only a few miles from the front, these depôts can quickly send up the necessary reinforcements in the event of severe losses being sustained; they can also, during periods of quiet, receive from the front men whose military training has proved to be insufficient.

The field recruit depôts constitute units which can be employed, if the necessity arises, on work behind the front, and they have occasionally been used in front line in

quiet sectors.

At the beginning of the Somme battle, a recruit battalion employed on the construction of rear defences actually became engaged in the fighting, and companies from a field recruit depôt were also employed in the Cambrai battle, in 1917, as an emergency measure.

As the field recruit depôts usually follow the formations to which they are attached, in the event of their moving from one sector to another, there is a system of exchange between the cadres of the regiments at the front and those of the field recruit depôts, so that officers and non-commissioned officers, temporarily unfit for service in the trenches, can be employed for instructional purposes at the depôt.

The amended establishment of the field recruit depôts, as laid down by the War Ministry order dated the 24th December, 1917, provided for 100 recruits for each

independent battalion and 900 recruits for each divisional field recruit depôt.

Training personnel.

(i.) For a depôt of at least 500 recruits:—I battalion commander, I lieutenant (adjutant), 1 battalion medical officer, 1 paymaster, 1 armourer-serjeant, 1 assistant armourer-serjeant.

(ii.) For the recruits of each infantry regiment, or 3 independent battalions:-1 company commander, 1 Feldwebel, 1 medical orderly.

(iii.) For each 100 recruits:—1 lieutenant, 1 Vizefeldwebel, 6 N.C.O's.

The divisional field recruit depôts are usually divided into 3 companies, each company supplying recruits to one of the regiments in the division. In some depôts a convalescent company is also included, to which men given light duty are allotted.

The recruits generally arrive at the field recruit depôt in a combined draft from the home depôts of all the regiments of the division. Sometimes, however, the field recruit depôt receives elements from a district other than that from which it normally draws

recruits.

The reinforcements from the field recruit depôts are distributed as required among the regiments which have gaps to fill; cases have occurred of reinforcements being sent from the field recruit depôt of one division to regiments belonging to another division at the front, and even from a field recruit depôt on the Western Front to a unit in Russia.

- 16. March battalions.—During the offensives of 1918, the drain on the field recruit depôts, caused by the heavy fighting, became so extensive, that the depôts were frequently exhausted of recruits. In order to save the time which would have been wasted in passing recruits from the home depôts through the field recruit depôts in the normal manner, a system of feeding front line units by the method of March battalions was brought into being. These March battalions, consisting of normally constituted units complete with first line transport, were formed at the home depôts of recruits with a staff of trained officers. The unit marched direct to its designated division, where the battalion was broken up and drafted to the regiments of the division, on completion of which the unit, reduced to a cadre, returned to the home depôt with its transport. It is known that in certain cases the battalions joined units in the field as constituted units, and were taken on the strength of the regiment as such, replacing battalions which had been annihilated.
- 17. Training centres.—As the depôts are for the most part in towns and thickly populated districts where training facilities are restricted, a number of training grounds (Truppen-Übungs-Plätze) existed in peace for carrying out combined training. These training grounds were situated at:—

Döberitz (III).
Jüterbog (III).
Zossen (III).
Altengrabow (IV).
Neuhammer (V).
Warthe (V).
Lamsdorf (VI).
Friedrichsfeld (VII).
Senne (VII).
Elsenborn (VIII).
Lockstedt (IX).
Munster (X).
Ohrdruf (XI).

Königsbrück (XII)
Zeithain (XII).
Münsingen (XIII).
Heuberg (XIV).
Oberhofen (XIV).
Gruppe (XVII).
Hammerstein (XVII).
Darmstadt (XVIII).
Orb (XVIII).
Arys (XX).
Bitsch (XXI).
Lechfeld (I Bav).
Hammelburg (II Bav).
Grafenwöhr (III Bav).

At most of these training grounds large permanent camps have been established during the war, e.g., Senne-Lager, Munster-Lager and Warthe-Lager. The new divisions formed during the war have generally been assembled and trained in these camps.

Besides the training camps in Germany, two very large training centres have been formed in the occupied territories, namely at Beverloo (east of Antwerp) and at Warsaw. The training centres at Beverloo and Warsaw act as reservoirs for the supply of drafts to the Western and Eastern Fronts respectively. Each has a permanent training establishment known as an *Infanterie-Ersatz-Truppe*.

The Infanterie-Ersatz-Truppe at Beverloo consists of 11 battalions, that at Warsaw of 4 battalions.

Recruits are sent from these camps as required, either direct to units in the field or to the field recruit depôts.

From the summer of 1917 onwards, in consequence of the collapse of the Russian Army, the training centre at Warsaw, as well as the field recruit depôts on the Russian Front, were largely drawn on to provide reinforcements for units in the west.

In several of the German armies there is an instructional formation (Übungs-Division) for training units out of the line. This is formed from the units in the army area. The

instructional staff is found by detaching officers and non-commissioned officers temporarily from their units.

18. Boys' Defence Corps.—An official organization for giving boys between 14 and 17 years of age preliminary military training and instruction in the use of the rifle and machine gun is now in operation in Germany. This work is under the supervision of a youths' military training society called the Jugendwehr.*

The boys are organized in companies and battalions throughout the German Empire.

The training received in the *Jugendwehr* does not entirely replace the recruit training undergone when the members are ultimately called up for military service, but it is meant to make them acquainted with military discipline and the elementary rifle exercises, thus reducing the time spent on routine drill during the period of recruit training in the army.

The Jugendwehr should not be confused with an organization similar to that of our Boy Scouts Association, which has for some time existed in Germany. The boy scout

detachments are known as Pjadfinder-Abteilungen.

^{*} The Baden Jugendwehr was dissolved in December, 1918. There is as yet no evidence that it is being dissolved in other parts of Germany.

CHAPTER II.

OFFICERS AND NON-COMMISSIONED OFFICERS.

1. Combatant officers.—In peace, the German corps of officers formed a distinct class or caste in social life. The appointment and promotion of officers remained a royal prerogative, and the holding of a combatant commission carried with it many material privileges in addition to a distinct social status.

At the same time the standard of professional efficiency was maintained at a very high level. Promotion to higher command or appointment to the General Staff was carefully

restricted to those who were efficient in every sense.

Although the system of a social caste possessed advantages in peace time, partly in ensuring the supply of officers, partly in maintaining the strict disciplinary standard of the German Army, it had to give way in war to more democratic relations. The rigid barriers which separated the German officer from his men have in fact disappeared. The wastage of war has caused a corresponding decrease in the standard of professional efficiency. Consequently, the confidence placed in their officers by the rank and file has considerably diminished.

2. Technical officers.—In addition to the corps of officers belonging to the combatant arms, there are other classes of officers employed in connection with various technical services, namely:—

Medical officers (Sanitätsoffiziere). Veterinary officers (Veterinäroffiziere).

Ordnance and artificer officers (Zeug- und Feuerwerks-Offiziere).

Fortress-construction officers (Festungsbauoffiziere).

These officers are graded on a scale corresponding to the ranks of combatant officers.

3. Military officials.—There is also an important branch of military officials (Militarbeamten) in charge of administrative services. They are divided into upper (obere)

and lower (untere) classes. Those of the former class rank as officers.

The upper class includes—

Judge-Advocates (Kriegsgerichtsräte).

Intendants (Intendanturräte). Paymasters (Zahlmeister). Chaplains (Militärgeistliche).

4. Grades of combatant officers.*—The grades of combatant officers in the German Army are as follows:—

(a.) General officers (Generalität).—
Generalfeldmarschall (Field-Marshal)
Generaloberst

General der { Infanterie‡ Kavallerie‡ Artillerie‡ }

Generalleutnant
Generalmajor

Nominal command or equivalent rank.†

Commands a Group of Armies.

Commands an Army.

Commands a Corps.

Commands a division.

Commands a brigade.

* For the badges of rank, see page 179.

‡ Denotes the arm of the service to which he belongs. A pioneer officer who rises to General's rank is called "General der Infanterie."

[†] At present, an army is usually commanded by a general and a corps by a lieutenant-general, while a division is frequently commanded by a major-general and a brigade by a colonel.

(b.) Regimental officers.—

Commands a regiment. *Oberst (colonel) Second-in-command of a regiment. *Oberstleutnant (lt.-col.) Commands a battalion. *Major (major) Captain of Infantry, Artillery and Hauptmann .. Engineers. Captain of Cavalry and Train. Rittmeister Lieutenant. Oberleutnant . . 2nd Lieutenant. Serjeant-major-lieutenant. [Feldwebelleutnant (not commissioned) Acting officer. Offizierstellvertreter (not commissioned) ...

5. Promotion and seniority of officers.—The promotion of officers is the prerogative of the Sovereigns of the four kingdoms of Prussia, Bavaria, Saxony and Wurttemberg. The first principle of promotion is that the officer promoted is thoroughly fitted in every respect for his new position. Even in peace this was determined by inspection and not by examination.

Except on the General Staff, promotion up to the rank of captain or major takes place within the regiment. Above the rank of major promotion takes place on a

general list.

Promotion was slow in peace according to our standard, but is now slightly more rapid for the junior ranks. The following table shows the average age at which officers reach the various ranks in peace and war respectively, on the assumption that an officer is first commissioned as a 2nd lieutenant at the age of 20:-

		less.								Peace.	War.
						1.5			199		25 1
Lieutenant				••				••	••.	29	
										36	291
Captain		1.50				40,40				$45\frac{1}{2}$	42
Major		•••		•••				• •		52	50
LieutColonel					••	••	•••	••	••		
Colonel		1125,513	Jene 3						•••	541	541
Major-General (Briga	de Cor	nmand	er) .			aria da	•••	•••	58	57
LieutGeneral	Divisi	onal (ommar	ider)						61	61
General (Corps	Comm	ander)	••		••		•••	.	65\frac{1}{2}	65

At present the average age of divisional commanders is 58, and that of Corps

commanders is 62.

Accelerated promotion is given to General Staff Officers in the ranks of lieutenant and captain; in peace, they reach the general list of majors about 6 years ahead of contemporary regimental officers. In war, the promotion of General Staff Officers is also accelerated. For instance, a number of General Staff Officers who became captains in March, 1912, were promoted to the rank of major in December, 1916, thus gaining nearly 2 years' seniority over the regimental officers of the same service.

The names, ranks and appointments of officers are given in the annual Army List

The Bavarian and Saxon Armies have separate Army Lists. (Rangliste).

^{*} Field officers are known as "Stabsoffiziere."

A Seniority List (Dienstaltersliste) is also published, giving the date of promotion to present rank.

Promotions, appointments and transfers are published under the heading of Personal-

Veränderungen in the Official Gazette (Reichsanzeiger).

An Officer's Commission (Patent) is issued by the Emperor through the Military When an officer is confirmed in his rank he is said to be "patentiert." When he

receives brevet-rank he is said to be "charakterisiert."

A memorandum of the Chief of the Military Cabinet, dated the 14th August, 1918, states that captains on the reserve list (Beurlaubtenstand) prior to the war-including those who had actually retired—who have spent a considerable time with combatant units. will be promoted brevet-major on the completion of seven years' service as captain. The period during which these officers were actually on the retired list (ausser Dienst) will not be counted as part of their period of service as captain.

6. Grades of medical and veterinary officers. The grades of medical and veterinary officers, who are assimilated in rank to combatant officers, but have no combatant titles, are as follows:-

```
MEDICAL GRADE.
                                                          Corresponding rank.
    Generalstabsarzt
                                                         Lieutenant-General.
     Obergeneralarzt (with an Army)
                                                         Major-General.
     Generalarzt
                    (with a Corps)
                                                         Colonel.
    Generaloberarzt (with a division) ..
                                                         Lieut.-Colonel.
    Oberstabsarzt
                    (with a regiment) ...
                                                         Major.
    Stabsarzt )
                                                        Captain.
                    (with a battalion)..
    Oberarzt \
                                                       Lieutenant.
    Assistenzarzt .
                                                        2nd Lieutenant.
VETERINARY GRADE.
    Generalveterinär
                                                        Colonel.
    Korpstabsveterinär
    Oberstabsveterinär
                                                        Major.
    Stabsveterinär
                                                        Captain.
    Oberveterinär ...
                                                        Lieutenant.
    Veterinär
                                                        2nd Lieutenant.
```

7. Grades of non-commissioned officers.—The principal grades of non-commissioned officers are as follows:-

```
Feldwebel
                   = Company-serjeant-major (infantry, foot artillery or engineers).
Wachtmeister
                   = Battery or squadron-serjeant-major (cavalry, field artillery
Vizefeldwebel
                   = Vice-serjeant-major (infantry, foot artillery or engineers).
Vizewachtmeister
                   = Vice-serjeant-major (cavalry, field artillery or train).
Fähnrich.
```

= Ensign.

The above non-commissioned officers are entitled to wear an officer's sword-knot and are (Portepee), classed as Portepeeträger.

Sergeant = Lance-serjeant. Unteroffizier = Corporal.

\ Oberjäger = Corporal in Jäger battalions. Obergefreiter = Bombardier (artillery).

Gefreiter = Acting-bombardier or lance-corporal. There is no rank exactly corresponding to the British serjeant or lance-serjeant, but the status of an *Unteroffizier* resembles that of a serjeant in the British Army, rather than that of a corporal. A Sergeant is a senior Unteroffizier.

- 8. Recruitment of officers.—The recruitment of the corps of officers is assured by the following methods:—
 - (a.) Appointment of cadets (Kadetten) from one of the 11 cadet schools.
 - (b.) Promotion of probationers (Fahnenjunker), who join the ranks as candidates for a commission.
 - (c.) Granting commissions in the Reserve of Officers to one-year volunteers.
 - (d.) Promotion of non-commissioned officers (in war only) to temporary rank.

The procedure in each of these cases is briefly described below.

(a.) Cadets. -The Central Cadet Institution (Haupt-Kadetten-Anstalt) is at Gross-Lichterfelde, near Berlin. The other 10 cadet schools are at—

Köslin (II Corps).

Potsdam (Guard Corps).

Wahlstatt (V Corps).

Bensberg (VIII Corps).

Plön (IX Corps).

Naumburg a/S. (IV Corps).

Karlsruhe (XIV Corps).

Oranienstein (XVIII Corps).

München (I Bav. Corps).

Dresden (XII Corps).

After a course of $2\frac{1}{2}$ years at a cadet school (Kadettenhaus), the cadet undergoes his ensign's examination ($F\ddot{a}hnrichspr\ddot{u}fung$). The cadets who pass out highest are posted at once to a regiment as 2nd Lieutenants. The remainder are given the rank of Ensign ($F\ddot{a}hnrich$) and undergo a 9 months' course of military training at a War School (Kriegs-Schule), of which there are at least eleven. They are then posted to a unit as 2nd Lieutenants "temporarily without a commission" ($vorl\ddot{a}ufg$ ohne Patent), and after being approved of by their brother officers are finally granted a commission.

(b.) Probationers.—In peace, a young man who had passed through the senior class at school, or who had undergone the ensign's examination mentioned above, joined a unit as a candidate for a commission (Fahnenjunker). After 3 months' service he was usually promoted to the rank of corporal. After six months he obtained a certificate from the officers of his unit to the effect that he was suitable, and was then sent to a War School for a course of training lasting 8 or 9 months. After the War School course the candidate was promoted to the rank of Fähnrich, and was posted to his unit for a short period of training, during which time he performed the duties of an Unteroffizier, before finally receiving his commission.

(c.) One-year volunteers.—In peace, one-year volunteers, after passing a special examination during their year's service, were transferred to the Reserve as "Officier-Aspiranten." After undergoing two annual trainings, passing another examination, and being suitably reported on, they obtained a commission in the Reserve of Officers. While in the Reserve they were liable to be called out for three annual trainings of 4 to 8 weeks.

Besides the above, officers who have retired from the Active Army with less than

18 years' service pass into the Reserve or Landwehr according to their age.

In 1913 the Army Lists contained the names of 23,000 Reserve officers and 11,000

Landwehr officers.

Officers of the Reserve or Landwehr have the words "der Reserve," "der Landwehr," after their rank—thus: "Hauptmann der Reserve," "Oberleutnant der Landwehr."

(d.) Promotion of non-commissioned officers.—In peace, provision was made for the promotion of a certain number of senior non-commissioned officers as acting officers on mobilization, receiving the grade of *Feldwebelleutnant* (serjeant-major-lieutenant).

The orders issued during the war with regard to Feldwebelleutnants are as

follows:-

"In all arms, vacancies in the establishment of 2nd Lieutenants may be filled by promoting Feldwebel or Vizefeldwebel, who had retired before the war after 12 years' service, to the rank of Feldwebelleutnant, provided they are of good character and have held a suitable position in civil life.

"Similarly, non-commissioned officers of good character who had retired with 8 years' service may be promoted to the rank of Feldwebelleutnant in Landsturm

formations, provided they are not fit for active service."

Another type of acting officer has been created during the war, namely the Offizier-Stellvertreter (acting officer). Acting officers of this grade never obtain a higher command than that of a platoon. Although treated as officers in the field, they are not entitled to the privileges of permanent commissioned rank. On demobilization, or discharge during the war, Offizier-Stellvertreter revert at once to the rank of Feldwebel or Vizefeldwebel. An Offizier-Stellvertreter can be promoted to the rank of Feldwebelleutnant.

9. The training of aspirant officers in war.—In war the methods of obtaining a commission in the Regular Army or in the Reserve of Officers are similar to those described above in paragraph 8, but the prescribed courses of instruction are of shorter duration.

Owing to the war, the number of commissions in the Reserve of Officers has been greatly increased. From two to ten Offizier-Aspiranten may be nominated at a time from each regiment at the front. After attending a special "Offizier-Aspiranten-Kursus" for 2 or 3 months the candidate returns to his unit for a short time as Vizefeldwebel or Feldwebel, after which he is promoted to the rank of Leutnant der Reserve.

Courses of instruction for Offizier-Aspiranten are held at all the big training centres

in Germany and behind the front (see page 19A).

The course lasts for 2 or 3 months. Each School of Instruction has from 1,600 to 2,000 pupils, who are formed into a regiment of four battalions, each of four companies. Each company, which comprises about 100 pupils, is divided into three platoons.

The school is commanded by a lieutenant-colonel, who is usually a Staff College graduate (Kriegs-Akademiker) The battalions are commanded by majors of the Regular Army; the companies are commanded by wounded or convalescent captains and subalterns.

The discipline at these schools is very strict; pupils are frequently returned to their units for misdemeanours or incompetence.

The instruction given is both theoretical and practical. The following programme is

typical of the subjects taught:-

(A.) Theoretical.—Lectures on tactics by an Active officer serving with a unit. Twice a week the pupils are given a tactical problem to solve on the ground, using the 1/100,000 map, and executing sketches to illustrate their work.

The duties of an officer; his relations to his men, to his comrades, to his superiors, to civilians, &c., code of honour. Discipline.

Short examination daily in duties in the field. Musketry and drill.

(B.) Practical.—Every morning the pupils carry out a tactical exercise on different ground with a skeleton enemy formed by one or two platoons. Nearly every pupil is called upon to command a platoon or a company. Casualties are

Handling and practice with grenades and trench mortars. Construction of shelters and dug-outs. Bridging exercise. Physical training.

At the conclusion of the course an examination is held consisting of-

Battalion drill.

Oral test. Inspection by the Commandant.

Written test. Writing reports.

10. Retirement of officers.—Officers who are definitely retired are described as "ausser Dienst" (a.D.). Officers who have retired after 18 years' service may at their own request be placed zur Disposition (z.D.), that is, on the unemployed list; they are then liable to be called up for service on mobilization.

During war-time, officers who are removed from their commands or appointments are placed zur Disposition.

11. Recruitment and training of non-commissioned officers.—In peace, non-commissioned officers were given a thorough general and military education, and their prospects in civil life after leaving the Army were assured. Under the German system of peace training, the duties and responsibilities of non-commissioned officers conduced to develop their initiative and self-reliance.

Non-commissioned officers are drawn from two sources -

- (a.) Training schools for non-commissioned officers.
- (b.) The ranks.

In peace, about 25 per cent. were drawn from training schools and the remainder were promoted directly from the ranks.

- (a.) The training schools.—The training schools are of two kinds—
 - (1.) N.C.O.'s Preparatory Schools (Unteroffizier-Vorschulen).

(2.) N.C.O.'s Schools (Unteroffizier-Schulen).

In the N.C.O.'s Preparatory Schools the education is of a general character and great attention is paid to physical development. The age of admission is from $14\frac{1}{2}$ to 17. The course lasts for 2 years.

There are nine N.C.O.'s Preparatory Schools, at Annaburg (IV), Bartenstein (1), Frankenstein (VI), Julich (VIII), Mölln (IX), Sigmaringen (XIV), Weilburg (XVIII),

Wohlau (VI) and Marienberg (Saxony).

On leaving the preparatory schools, the pupils join the N.C.O.'s Schools, of which there are eight, at Marienwerder (XVII), Northeim (X), Potsdam (Guard), Treptow a/R. (II), Weissenfels (IV), Wetzlar (XVIII), Fürstenfeldbrück (Bavaria) and Marienberg (Saxony).

The age of admission to these schools is between 17 and 20. The training is free and

the course is a purely military one. In peace the course lasted 2 years.

On leaving the schools the pupils are posted to regiments as Unteroffiziere.

(b.) From the ranks.—The majority of non-commissioned officers are drawn from the ranks. In peace they were selected during their Active colour service, and induced to re-engage (kapitulieren) by the offer of a bounty (Kapitulations-Handgeld). Re-engaged men (Kapitulanten) were given special instruction and a special rate of pay; they were promoted, generally, after 2 years' further service.

In war, likely men are picked out by their commanding officers and sent for a course of training, either in the divisional or Corps field recruit depôts, or in special non-commissioned officers' training courses (Unteroffizier-Lehr-Kurse), which are held in

In some Corps, each regiment has an instructional company (Lehr-Kompagnie), in which

suitable candidates for promotion are trained.

A considerable number of men from the cavalry have been promoted during the war to non-commissioned rank in infantry units.

12. Pay and allowances.—Pay is termed Gehalt in the case of officers, and Löhnung in the case of non-commissioned officers and men. In peace time there were various allowances (Gebührnisse), such as Kommandogeld, Stellenzulage and Tischgeld.

Officers' pay is credited monthly in advance on the first day of each month; the pay of non-commissioned officers and men is credited on the 1st, 11th and 21st of each month (i.e., every 10 days), and the month is reckoned at 30 days. (In joining, recruits receive an allowance for cleaning materials (Putzzeuggeld), amounting to 7:10 marks for dismounted, and 8.80 marks for mounted men.

Special allowances and rates of pay were granted to officers and other ranks of the

Beurlaubtenstand, i.e., non-Active army, when called up for training or manœuvres. Prior to the war, the daily rates of pay for officers were as follows:-

Corps commander 87.60 marks. Divisional commander Brigade commander .. 49.50Colonel (commanding a regiment) .. 30.50" Major or Lieut.-Colonel Captain, over 9 years' service ٠. 14.00 Captain, 5th to 9th year " . . 12.60 Captain, 1st to 4th year " 9.3377

Lieutenant or 2nd Lieutenant—				
Over 13 year's service	195 • 40	••	 - 6.6 marks	5.
10th to 13th year		•	 5·7 ·,,	
7th to 9th year				
4th to 6th year		•		
1st to 3rd year			 4.1 "	

The above rates include command pay (Dienstzulage) for officers of the rank of brigade

commander and upwards.

During the war, the pay of the junior ranks has been considerably increased. A subaltern on joining receives 8.33 marks a day, which is increased to 10.33 marks after a year's service. A subaltern commanding a company receives 12.33 marks. A captain receives 21.83 marks while commanding a company, and 24.33 marks when commanding a battalion.

A flying officer or non-commissioned officer receives flying pay at the rate of 5 marks

a day in addition to the above rates.

On the 21st December, 1917, the rates of pay for non-commissioned officers were raised by 20 per cent., and for men by 33 per cent.

On the 1st August, 1918, a further increase was sanctioned by the Emperor.

The following table shows the daily rates of pay (in marks) of the various non-commissioned ranks (1 mark is nominally equivalent to 1 shilling):—

	Old	scale.	New scale.	
Rank.	At home.	In the field.	At home.	In the field.
Feldwebel or Wachtmeister (company-serjeant-major, &c.)	3:20	4.20	4.00	5 .30
Vizefeldwebel or Vizewachtmeister	1 .90	2 10	2.50	2 .83
Sergeant or Unteroffizier after 5½ years' service	1 .65	1 .90	2.20	2.55
Unteroffizier or Fähnrich	1.12	1 .33	1 .60	1.90
Gefreiter (lance-corporal) mounted services dismounted services	$\begin{pmatrix} \cdot 43 \\ \cdot 38 \end{pmatrix}$.63	·77 }	1 .05
Gemeiner (private) mounted services	.38 }	•53	$\begin{bmatrix} \cdot 70 \\ \cdot 64 \end{bmatrix}$	1.00

The daily rates of separation allowance for non-commissioned officers were raised in July, 1917, and are now as follows:—

 Wife
 ...
 1.60 marks.

 Wife and 1 child
 ...
 2.10 ",

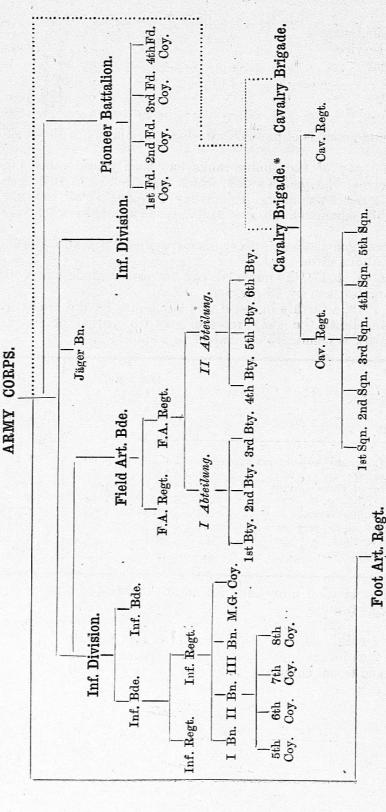
 Wife and 2 children
 ...
 2.60 ",

 For each additional child
 ...
 0.60 ",

CHAPTER III.

THE MOBILIZATION AND EXPANSION OF THE GERMAN ARMY.

PEACE ORGANIZATION OF AN ARMY CORPS.

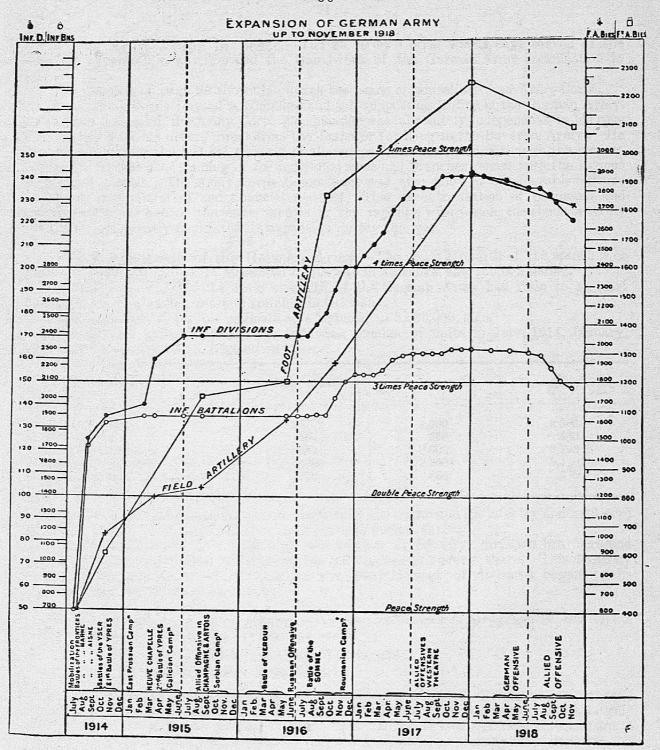


1st Bty. 2nd Bty. 3rd Bty. 4th Bty. 5th Bty. 6th Bty. 7th Bty. 8th Bty.

II Bn.

* The cavalry brigades were administered by the Army Corps in the district of which they were formed, though not forming an integral part of the Army Corps. In addition to the above combatant arms, the Army Corps comprised a Train Detachment (Train-Abteilung), an Administrative Department (Militär-Intendantur), a Clothing Office (Belleidungs-Amt), and a Medical Office

(Sanitäts-Amt).



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1. The Army Corps in peace.—The 25 Army Corps, which have served as the basis for expansion in war, formed the framework of the German Army organization in peace.

The diagram on page 29 shows in outline the peace organization of an Army Corps.

Each Army Corps formed a complete and self-supporting entity in the German Army. As regards command, the Army Corps Commander was absolutely independent in his own district, and took his orders direct from the Emperor (or King in the Bavarian Army). He was responsible for the tactical training of all troops in his command, although the responsibility for the technical training of the individual arms and branches rested with the various Inspector-Generals. The Army Corps Commander was also allowed considerable latitude as regards administrative and financial matters. This decentralization of command and responsibility was one of the main factors in the rapidity with which the German Army mobilized, and greatly facilitated its expansion during the war.

2. The expansion of the German Army.—The peace strength of the standing or Active German Army in 1914 amounted to 800,646 of all ranks, and 160,092 horses.

At the end of 1917, the total strength of the German Army had risen to at least 6,000,000 men, excluding recruits training in Germany.

By November, 1918, this estimate was reduced to 5,000,000 men.

The various arms comprised the following number of units in July, 1914, January, 1918, and November, 1918, respectively:—

	July, 1914.	January, 1918.	November, 1918.
Infantry battalions	670*	2,300	2,060
Cavalry squadrons	550	2,300 570	440
Field artillery batteries	642	2,900	2,705
Foot artillery batteries	400	2,250†	2,1,00
Pioneer companies	150	650	680

The accompanying diagram shows graphically the expansion (in infantry and artillery)

up to the end of 1917, and the subsequent changes during 1918.

It is noteworthy that, although the number of infantry divisions has increased nearly $4\frac{1}{2}$ times, the number of battalions has only increased about 3 times. This disparity originated in the spring of 1915, when the establishment of divisions began to be reduced from four to three regiments.

- 3. The machinery of expansion.—As seen in Chapter I, paragraph 13, the depôts (Ersatz battalions, &c.) fulfil a twofold rôle:—
 - (a.) The supply of drafts to the field units, and
 - (b.) The creation of new formations.

As each Ersatz battalion (squadron or Abteilung) is provided with one or two "recruit depôts" for the elementary training of recruits, the Ersatz battalion itself consists largely of trained, or at any rate partially trained, men. Every Ersatz battalion is, therefore, a potential new unit which may eventually take the field, and has in many cases done so.

^{*} Made up as follows: -651 infantry battalions, the Lehr-Infanterie Bataillon and 18 Jäger battalions.

† 4 guns per battery.

‡ 3 guns per battery.

At the beginning of the war, in the majority of infantry brigades, two companies were formed in each depôt of each Active regiment from the best elements that were surplus to the immediate needs of mobilization. These companies were combined to form a brigade Ersatz battalion which bore the number of the brigade in which it was formed. In the same way a number of Reserve and Landwehr brigade Ersatz battalions were formed later on in the depôts of Reserve and Landwehr regiments. These brigade Ersatz battalions were grouped together to form Ersatz brigades, and were eventually (in the summer of 1915) regrouped as infantry regiments. The Ersatz brigades formed in this way were incorporated in the Ersatz divisions which took the field during the autumn of 1914.

Instead of merely acting as the parent stock of new formations, as described above, the Ersatz battalions themselves in many cases took the field as mobile units. These "mobile Ersatz battalions" were combined to complete the series of infantry regiments numbered from 349 to 382.

The new infantry regiments, raised in the autumn of 1916, and numbered between 383 and 480, were formed in various ways:—*

(a.) In a number of Army Corps Districts each Ersatz battalion raised a company at war establishment, composed of men fit for field service. These companies were combined to form new infantry regiments (e.g., the 411th and 412th Infantry Regiments, formed in the X Corps District).

(b.) In a number of divisions in the field a complete company was withdrawn from every infantry regiment. The vacancies in the regiments drawn upon were filled by drafts from the depôts, and the companies withdrawn were combined to form new regiments (e.g., the 392nd Infantry Regiment was formed from the regiments of the XIX Corps and XII Res. Corps, and the 393rd was formed from the

7th Div., 8th Div., 12th Div., and 50th Res. Div.).

(c.) In certain field recruit depôts and training centres new regiments were organized from the fittest Landsturm and Landwehr men picked out of Landsturm battalions on the Lines of Communication, or from the garrison battalions in Germany. These new units were stiffened with a proportion of returned wounded, but their fighting value was not high, and they were sent to quiet sectors of the front (e.g., the 384th and 386th Landwehr Infantry Regiments).

New units of the other arms were usually created by the first of these methods, e.g., the 263rd F.A. Regiment was formed by combining the Ersatz batteries raised in the depôts of all the field artillery regiments in the I and XX Corps Districts.

4. Mobilization and the process of expansion in 1914,—On mobilization in August, 1914, the 50 Active divisions were brought up to War Establishment with reservists, and the extra Guard Regiments formed a 3rd Guard Division.†

In addition to these 51 Active divisions, 32 Reserve divisions were formed from the surplus reservists in the depôts, and also from the Landwehr 1st Ban. Some Active Corps had in peace a surplus infantry brigade or regiment which served to stiffen the Reserve

^{*} It should be mentioned that the series of new regiments numbered from 383 to 441 were formed in the field, while those numbered from 442 to 478 were formed in the training centres in Germany and were combined in the new series of divisions raised at the beginning of 1917 (see page 35).

† The instructional battalion of the Guard Corps was expanded into the Lehr-Regiment,

The Reserve Corps, which were numbered correspondingly to the Active Corps. took the field simultaneously with them. They were organized similarly to the Active Corps, except that a Reserve division was only provided with 9 field artillery batteries instead of with 12.

At the same time, a number of Landwehr and Ersatz brigades were formed from the Landwehr 2nd Ban and from the trained Ersatz reservists available. These formations were at first used only on the Lines of Communication of the advancing armies. They were,

later, largely combined to form Landwehr and Ersatz divisions.

As the Ersatz Reserve, surplus reservists and Landwehr men, together with a constant stream of war volunteers, still provided a large surplus of man-power, it was decided soon after the outbreak of war to increase the number of Army Corps. About the middle of October, 1914, six fresh Corps and an extra Bavarian Reserve division (i.e., 13 divisions), together with a Naval division, left the depôts for the front.

These 13 divisions formed the first series of new formation Reserve divisions formed after mobilization had been completed. These Reserve divisions were numbered between 43 and 54, and formed the Reserve Corps numbered between XXII and XXVII; the 6th Bavarian Reserve Division also belongs to this series. The new Corps consisted of Landwehr men, Ersatz reservists and a large number of volunteers from the classes not

previously called up.

The depôts in Germany were then filled up with the 1914 Class, the remaining Ersatz reservists and additional volunteers. Owing to the large number of men put back from the classes of previous years, the incorporation of the 1914 Class afforded an opportunity for still further increasing the army in the field, and in February, 1915, four fresh Reserve Corps and another Bavarian Reserve division (i.e., nine divisions) had been sent to the front. These nine divisions made up the second series of new formation Reserve divisions, numbered between 75 and 82, forming the Reserve Corps numbered between XXXVIII and XLI; the 8th Bavarian Reserve Division also belongs to this series. At the same time, the Naval Division had been expanded to a Corps, and some additional Landwehr brigades had been formed.

Thus in February, 1915, the German forces in the field had risen to:-

51 Active divisions.

32 Reserve divisions formed on mobilization. in October, 1914. 13

in February, 1915,

a total of 105 Active and Reserve divisions, and the equivalent of 38 Landwehr, Ersatz and additional divisions.

5. Formation of the reconstituted divisions in 1915.—In the spring of 1915, the prospect of offensive operations in Russia during the summer necessitated a further increase in the number of mobile field units.

The winter campaign had, however, exhausted the 1914 Class and practically the whole of the trained Landsturm, so that there were not sufficient trained men in the depôts

to form new regiments.

The increasing importance of artillery, and the frequent divisional reliefs occasioned by the conditions of trench warfare, made possible a reduction in the infantry strength of the division.

(6754)

Thus, 19 new divisions* were raised in March and April, 1915, which were organized on a 3-regiment instead of a 4-regiment basis. Their formation involved the creation of no new infantry units, but was effected by grouping together three existing infantry regiments withdrawn from three Active or Reserve divisions. In this way a certain number of

Active and Reserve divisions were also reduced from 4 to 3 infantry regiments.

In June, 1915, four new independent infantry brigades were formed on the Western Front by the creation of new infantry regiments. These brigades were numbered 183, 185, 187 and 192; they consisted of three infantry regiments and were as strong in infantry as the reconstituted divisions. The regiments of these divisions were formed by withdrawing trained men from units fighting on the Western Front. When first formed, presumably because only three field batteries were available for each, these units were classified as brigades; a year later they received their full artillery complement and were raised to the status of divisions, In August, 1915, the number of divisions in the field had risen to 170.

6. New formations raised in 1916.—Beyond a steady increase in the formation of artillery and technical units, no noteworthy expansion of the German Army took place between June, 1915, and June, 1916, but the trench mortar and machine gun units were completely reorganized.

At the latter date the strain on the Eastern Front caused by the Russian offensive, together with the prospective lengthening of the line involved by the imminent entry into the war of Roumania, necessitated a further increase in the number of mobile

field units.

Between 1st June and 31st December, 1916, a further series of 34 new divisions was raised. Some of these (series 195-200) were formed by grouping together Jäger battalions and odd battalions withdrawn from existing divisions, but the great majority of them (series numbered over 200) were reconstituted with the fourth regiments of Active and Reserve divisions, similarly to the reconstituted divisions formed in the spring of 1915.

Among the divisions formed on the Eastern Front during 1916 were the 91st, 92nd

and 93rd, which were of poor quality.

At the same time, the number of battalions in the German Army was increased by the formation of between 60 and 70 new infantry regiments in the manner described on page 32. In a few cases the new divisions (201st to 205th Divisions, 19th and 20th Landwehr Divisions and 12th Bavarian Division) were composed entirely of these new infantry regiments. In general, however, the new infantry regiments were sent to Active or Reserve divisions to replace the old regiments withdrawn to make up the new divisions. By the end of 1916 the number of divisions in the field had risen to 203.

The reduction in the divisional establishment had the additional advantage of setting free an infantry brigade staff in each division so reduced; in this manner a number of trained staffs were obtained for the 19 new divisions reconstituted by the process described

The field artillery of the series of reconstituted divisions was obtained by a general reduction of all the existing field batteries from 6 to 4 guns. The divisional artillery of these divisions consisted of from 9 to 12 field batteries, the establishment being eventually fixed at 9 batteries.

^{*} In addition to these 19 divisions, the 108th and 109th Divisions were formed on the Russian Front in November, 1915,

7. New formations raised in 1917.—At the beginning of 1917, a new series of divisions, 13 in number, was formed in Germany. These divisions were numbered from 231 to 242, together with the 15th Bavarian Division. The rank and file of these divisions were composed as follows:—

50 per cent.... ... recruits of the 1918 Class.

25 per cent.... recovered wounded from the depôts in Germany.

25 per cent. ... trained men withdrawn from the front.

The requisite number of trained men was provided by withdrawing about 10 seasoned men per company from the majority of the divisions on the Western Front. The cavalry and artillery for these new formations were provided by the squadrons and batteries set free owing to the general reduction in the divisional establishment.

These 13 divisions took the field during February, March and April, 1917, three of them being sent to Russia, the remaining 10 to the Western Front. They did not prove a success,

owing to the high percentage of the immature 1918 Class which they included.

In addition to these 13 entirely new formations, a further number of new divisions was raised by regrouping the fourth regiments which still existed in a number of divisions, Active, Reserve and Landwehr. Most of the independent Landwehr brigades were thus raised to the status of divisions. In this way all divisions were brought on to the uniform 3-regiment basis, the following new divisions being formed:—

5th Guard, 94th, 95th, 96th, 219th, 220th, 227th, 228th, 301st, 302nd, 16th Bavarian, 3rd Naval, 21st Landwehr, 22nd Landwehr, 23rd Landwehr, 24th Landwehr, 26th Landwehr, 29th Landwehr, 38th Landwehr, 44th Landwehr, 45th Landwehr, 46th Landwehr, 48th Landwehr.

By the end of 1917, the number of divisions in the field had risen to 241, excluding the German contingent with the Turkish armies and 3 semi-instructional divisions employed inside Germany for frontier defence.

8. Disbanding of units during 1918.—Early in 1918, the existence of a new division, the 303rd, was established in the Eastern Theatre. On the 1st March, 1918, the number of divisions in the German Army was accordingly 242, comprising 2,301 battalions.

During March the German units under the 302nd Division, in the Balkans, were transferred to the Western Theatre. From this date the 302nd Division administered Bulgarian units only, and ceased to be counted as a German division. The very heavy fighting experienced by the German forces on the Western Front during the offensives from March to July, and the subsequent reverses resulting from the Allied counter-offensive, created a shortage in man-power which the Higher Command was unable to meet by normal measures. As drafts were not available for re-establishing those units which had been reduced to skeleton formations by heavy fighting, they were disbanded and drafted to other formations. In the majority of cases, divisions so disbanded were entirely broken up. In a few cases the divisional staffs were retained and employed on the organization of rear defence works, or were transferred to other theatres to administer composite formations.

The following divisions were broken up:-	
108th Division.	46th Reserve Division.
109th ,,	47th ", ",
183rd "'	53rd ", "
197th "	54th ,, ,, ,,
201st ,,	77th ,, ,,
223rd ",	78th ,. ,. ,,
22 5th ,,	10th Bavarian Division.
233rd "	9th Bavarian Reserve Division.
235th "	10th Landwehr Division.
25th Reserve Division.	Bavarian Ersatz Division.
33rd ", "	
In the case of the following divisions, the staff	fs are still in existence:—
101st Division.	43rd Reserve Division.
211th "	14th Bavarian Division.
222nd ,,	14th Landwehr Division.
226th ,,	302nd Division.
6th Reserve Division.	303rd ,,

During the same period, a number of regiments, not belonging to the divisions mentioned above, have been disbanded, while a few odd battalions hvae been formed.

In addition, the 31st and 84th Landwehr Brigades became independent, and were counted as the equivalent of a division.

The following table gives a summary of the changes:-

	Divisions.	Battalions.
st March, 1918	242 30	2,301 235
Total on 11th November, 1918	212	2,066

9. Organization of an infantry division in war.—Before the war the Army Corps was the tactical as well as the administrative unit of the German Army. Under the conditions of the present war, where divisions are constantly being relieved and interchanged, the Corps has not proved a suitable tactical unit, and, in the German Army, as in other armies, the *Division* is now the unit of tactical manœuvre, *i.e.*, the smallest self-contained formation of all arms. At the same time, the mobility of the division has been increased by reducing the proportion of infantry (see paragraph 5 above).

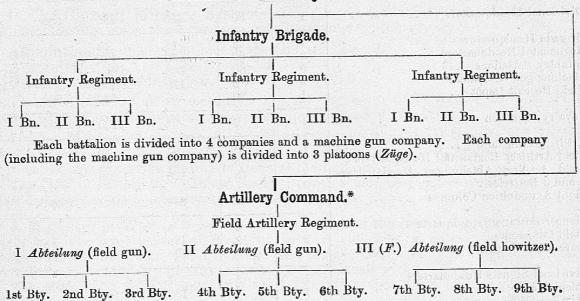
From the spring of 1915 onwards, the new divisions raised have been independent of a Corps formation (fliegende Divisionen); the new Corps staffs which have since been formed have no permanent connection with any division. At the end of 1918 there was only one Corps staff for every $3\frac{1}{2}$ divisions in the field, and in many cases even the Active divisions had been entirely dissociated from their original Corps staffs.

All German divisions are now organized on the 3-regiment basis, the three infantry

regiments (9 battalions) being grouped under one infantry brigade staff.

The infantry and artillery of practically every division in the German Army are now organized in the following manner:—

DIVISIONAL HEADQUARTERS.



(The approximate establishment of a German infantry division is given on page 38.)

^{*} Since the spring of 1918 a battalion of foot artillery has been allotted to a German infantry division as divisional troops. Battalions so allotted consist usually of three batteries, two of 15 cm. howitzers and one of 10 cm. guns.

The approximate establishment of a German infantry division is given below:—

- Kontroller	Number.	Officers.	Other ranks.	T	otals.	Horses
Divisional Headquarters	. 1	- 30	250	280	280	60
Brigade Headquarters Regimental Headquarters Infantry Battalions	3	3 30 180	11 150 4,500	14 180		10 60
Machine-gun Companies Field Recruit Depôt	9	36 20	1,170 500	4,680 1,206 520	6,600	720 180 14
Cavalry Squadron	1	6	94	100	100	127
Artillery Command Field Artillery Regimental Headquarters Field Artillery Abteilungen (Headquarters and 3 Batteries).		6 5 78	23 20 1,128	29 25 1,206	• • •	21 14 699
Light Ammunition Columns	3	9	231	240	1,500	240
Pioneer Battalion Headquarters Field Companies Searchlight Section	1 2 1	2 12 	5 488 20	7 500 20	 527	4 50 15
Divisional Signals Headquarters Telephone Detachment Wireless Detachment	1 1 1 1	2 6 2	7 180 85	9 186 87	282	4 105 25
Bearer Company Field Hospitals Veterinary Hospital Divisional Mechanical Transport Column	1 2 1 1	8 18 2 1	240 116 73 30	248 134 75 31	 488	50 50 6
Foot Artillery Battalion Headquarters Foot Artillery Batteries Battery Ammunition Columns	1 3 3	1.8 3	55 510 210	59 528 213		31 285 180
Total		481	10,096		10,577	2,950

The above units are all "divisional troops,' and move as integral portions of the division. Other units, such as:—

Heavy artillery units,* survey units, mining companies, machine gun marksman detachments, *Minenwerfer* battalions, Echelon staffs (comprising columns and train), and labour units,

are allotted by the Higher Command to divisional sectors as required, and are temporarily placed under the orders of the division in whose sector they happen to be. They do not, however, move with the division when the latter is relieved.

^{*} Since the spring of 1918 a battalion of foot artillery has been allotted to a German infantry division as divisional troops. Battalions so allotted consist usually of three batteries, two of 15 cm. howitzers and one of 10 cm. guns.

CHAPTER IV.

COMMAND AND STAFFS.

1. The German Military System.—The general military system of the German Army falls broadly under three headings, which are kept quite separate:-

Appointments, under the Chief of the Military Cabinet.

Administration, under the Minister of War.

General Staff, under the Chief of the General Staff.

The three officers* above mentioned are the highest military authorities and act as personal advisers to the Emperor, who is the supreme head of the Army.

2. The Military Cabinet (Militar-Kabinett) issues the Official Gazette and Cabinet Orders, and controls all appointments, promotions, transfers, exchanges, retirements, honours and rewards, except for the posting of General Staff officers.

The Chief of the Military Cabinet is senior personal aide-de-camp and military secretary

to the Emperor, and is practically his ear and mouthpiece.

3. Ministry of War (Kriegs-Ministerium) — Each of the four Sovereign States of the Empire has its own Ministry of War, but, in war, authority is entirely centred in the Prussian Ministry of War, while those of the other States merely arrange local details. Only the Prussian Ministry of War will, therefore, be dealt with in this chapter.

The Minister of War is appointed by the Emperor, and is the highest administrative

authority in the German Army, but exercises no military command over the troops in the

field.†

Lieut.-General Wild von Hohenborn, who held this appointment during the first part of the war, was replaced in October, 1916, by General von Stein, who retired in October, 1918, in favour of Major-General Scheüch. The latter resigned in December, 1918. The Minister of War is assisted by a Chief of the Acting General Staff (Chef des stellvertretenden Generalstabes der Armee).

The Ministry of War, which in peace comprised six departments, now consists of

eight:

1.—Central Department. (Zentral-Department, ZD.)

(a.) Ministerial Section. (Z1.)

(b.) Estimates and Establishments Section. (Z2.)

(c.) Publicity Section. (Z3.)

(d.) Central Information Bureau. (NB.)

II.—General War Department. (Allgemeines Kriegs-Departement, AD.)

(a.) Army Section (A1.) and Mobilization Section (Mob. A.)

(b.) Supply of Officers and Non-commissioned Officers Section (C 1a).

(c.) Infantry Section. (A2.) (d.) Cavalry Section. (A3.)

(e). Field Artillery Section. (A4.)

(f.) Foot Artillery Section. (A5.)

^{*} The names of the officers holding these appointments are given in the Index to "The German Forces in the Field," as are also the names of the higher commanders mentioned on page 42. † The Minister of War, however, directly controls the Home Army (Heimatsheer)

(g.) Engineer and Pioneer Section. (A6.) (h.) Communication Section. (A7V.) (i.) Air Section. (A7L.)(k.) Chemical Section. (A10) (l.) Signals Section. (A. Nch.) (m.) Railway Section. (AE.)* III.—Army Administration Department. (Armee-Verwaltungs-Departement, BD.) (a.) War Supply Section. (B1.)
(b.) Peace Supply Section. (B2.) (c.) Clothing Section. (B3.) (d.) Finance Section. (B4.) (e.) Central Depôt for captured War Material. (ZK.) IV .- Quartering Department. (Unterkunfts-Department, UD.) (a.) Quartering Section, Western Front. (U1.) (b.) Quartering Section, Eastern Front. (U2.) (c.) Training Grounds Section. (U3.) (d.) Works Section. (U4.)

(e.) Section for the Protection of German Prisoners of War and for Breaches of International Law. (U5.)(f.) Section for Rationing Prisoners of War. (U6.) (g.) War Quartering Section. (UK.) V.—Pensions and Law Department. (Versorgungs- und Justiz-Departement, CD.) (a.) Pensions Section. (C2P.) (b.) Annuity Section. (C2R.) (c.) Assistance Section for Officers and Men. (C3F.) (d.) Assistance Section for Soldiers' Dependents. (C3V.) (e.) Law Section. (C4.) VI.—Remount Inspection. (Remonte-Inspektion, RI.) VII.—Medical Department. (Sanitäts-Departement, SD.) (a.) Personnel Section (S1.) (b.) Medical Section. (S2.) (c.) Assistance Section. (S3.) VIII.—War Bureau. (Kriegs-Amt, K.) (a.) War Recruiting and Labour Department. (ED)-

(1.) War Recruiting Office. (C 1b.) (2.) War Labour Office. (AZS.)

(b.) Munitions Department (Wumba†), which has absorbed the Department of the Master of Ordnance (F2), and the Manufactories Section of the Ministry of War (B5).

(c.) War Raw Materials Section (KRA), combined with a Purchase Section for Requisitioned Textiles (Ab. W).

(d.) Exports and Imports Section. (A8.) (e.) National Food Supply Section. (B6.)

^{*} For the duration of the war only.

[†] Waffen- und Munitions-Beschaffungs-Amt.

The new departments formed in the War Ministry during the war are No. IV

(Quartering) and No. VIII (War Bureau).

The War Bureau is the department which is charged with utilizing to the full the resources of the country for war. It was created in October, 1916, when the Ministry of War and General Staff were reorganized, and its five branches, mentioned above, deal with the subjects enumerated below:—

(a.) The War Recruiting and Labour Department has three reporting offices (Referate)

connected with parliamentary business and Press propaganda.

There are also six reporting offices for agriculture, mining, steel and machinery, chemistry, armament firms, and exemptions. Besides these there are five sections dealing with the various sources of labour, namely women, prisoners of war and enemy aliens, allied and neutral aliens, civilians between 17 and 60 available under the Auxiliary Service Act, skilled mechanics withdrawn from the army, and soldiers not yet called up.

(b.) The Munitions Department is divided into four main sections:-

Central Section.

Inspection of Technical Artillery Establishments and Pioneer Depôts.

Inspection of Artillery Depôts. Depôt Inspection (divided into four sub-sections).

Inspection of Technical Infantry Establishments. This branch also inspects

the engineer and other depôts.

(c.) The War Raw Materials Section is divided into 19 sections and deals with explosives, leather, metals, wood, wool, fibre, silk, rags, textiles, rubber, cotton and other raw materials.

(d.) The Exports and Imports Section deals with statistical questions and the policy

connected with imports, exports and special contracts.

(e.) The National Food Supply Section operates in conjunction with the War Food Department.

Connected with the War Bureau is a "scientific commission" of 20 leading scientists, who form a technical advisory board; there are also legal and financial experts, and special sections for economic propaganda work in neutral countries and among the troops, and for distributing information among the manufacturers of war supplies.

4. The General Staff.—The Staff consists of :—

(a.) The General Staff (Generalstab), including the Adjutantur.

(b.) The Great General Staff (Grosser Generalstab).

The General Staff supplies officers for the whole Army.

With few exceptions, every staff officer has undergone a course of three years' training at the Staff College (*Kriegs-Akademie*), and has been attached to the Great General Staff,

before taking up an appointment on the staff of a Corps or division.

The Adjutantur, i.e., the Administrative or Routine Staff, consisted in peace mainly of Staff College graduates who had not been selected for appointment to the General Staff. Adjutantur officers hold 2nd Grade appointments on the staffs of Corps, divisions, and brigades.

The Great General Staff is an inner ring of selected staff officers working in Berlin and at General Headquarters, directly under the Chief of the General Staff. Its work comprises everything which comes under the heading of Operations, Movements and Intelligence.

5. General Headquarters.—Up to March, 1917, General Headquarters (*Grossés Hauptquartier*) was at Charleville. The Emperor's General Headquarters was then moved back to Kreuznach,* while General Headquarters for the Western Front remained at Charleville. All orders and gazettes concerning the Field Army are issued from General Headquarters, with the exception of administrative and technical orders, which emanate from the Ministry of War.

The General Staff at General Headquarters is presided over by the Chief of the General Staff of the Field Army, who has a special section under him, concerned with operations and ammunition allotment. The organization of this section is given on the attached table.† The Quartermaster-General (General quartiermeister) and a branch of the Ministry of War are also at General Headquarters. In addition, there are the following

Directors and heads of departments:

General of Foot Artillery (General von der Fussartillerie).

Director of Railways (Chef des Feldeisenbahnwesens).

General Commanding the Air Forces (Kommandierender Gen. der Luftstreitkräfte).

Director of Signals (Chef des Nachrichtenwesens).

Director of Mechanical Transport (Chef des Feldkraftfahrwesens).

Director of Survey (Chef des Kriegsvermessungswesens).

Director of Medical Services (Chef des Feldsanitätswesens).

Intendant-General of the Field Army (General-Intendant des Feldheeres).

Director of Anti-Aircraft Guns (Chef der Flug-Abwehr-Kanonen).

Commander of Gas Troops (Kommandeur der Gastruppen).

Camp Commandant (Erster Kommandant des Grossen Hauptquartiers).

The General of the Engineer and Pioneer Corps is at General Headquarters on the Western Front.

The War Ministry is represented by a staff at General Headquarters.

6. The Higher Command.—The supreme command of the Field Army (Oberste Heeresleitung) is vested in the Emperor as Oberkommandierender Kriegsherr. The Emperor's principal adviser with regard to all military operations is the Chief of the General Staff of the Field Army (Chef des Generalstabes des Feldheeres), who has under him a special department dealing with operations and ammunition allotment.

Early in 1915, General von Moltke was succeeded as Chief of the General Staff by Lieut.-General Erich von Falkenhayn. He was, in turn, succeeded by Field-Marshal von Hindenburg in August, 1916. Under the Chief of the General Staff is the Erster Oberquartiermeister or Deputy Chief of the General Staff, Gröner (formerly Ludendorff).

The Emperor nominally retains the personal command of the main Groups of Armies

operating on the Western Front.

The higher command in the Eastern Theatre is delegated to the Commander-in-Chief on the Eastern Front (Oberbefehlshaber Ost), and to the Commander-in-Chief in the South-Eastern Theatre.

The Commander-in-Chief on the Eastern Front (Obost has practically a separate General Headquarters, with the following independent directors:-

> Director of Ammunition Supply (Chef des Feldmunitionswesens beim Obost). Director of Medical Services (Feldsanitätschef beim Obost). Army-Intendant (Armee-Intendant beim Obost).

† Page 42A.

^{*} The Emperor's General Headquarters was moved to Spa in February, 1918.

DISTRIBUTION OF DUTIES OF THE OPERATIONS SECTION UNDER THE CHIEF OF THE GENERAL STAFF OF THE ARMY IN THE FIELD, 11TH NOVEMBER, 1917.

Officer in charge of the registry (Büro-Offizier)—Captain.

Section Ia.

Head of Section-Major.

Liaison officer on the Western Front. Major ... Operations (excluding the Macedonian Front), troop movements, protection of 2 Captains frontiers and coast defence, training of troops, measures for the stoppage of the postal services, designation of battles and engagements, leave, reports regarding events in the various theatres

4 Captains Daily reports, daily communiqué, reports to His Majesty, lectures on the situation, instruction of the Press, examination of publications, war diary, situation maps.

Section Ic.

Head of Section-Major.

Major ... Peace and war organization in the future, mobilization and demobilization, general instructions.

Captain ... Machine guns, machine-gun units air forces (aeroplanes, balloons, airslips, anti-aircraft guns, anti-aircraft searchlights), aerial defence in Germany; orders for placing divisions under Corps, &c., or for them to act as independent formations.

Captain ... Order of battle on the Eastern Front, situation with regard to the army on the Eastern Front, field artillery and field artillery practice camps, exchange of German and Austro-Hungarian officers, Polish Army, Ski troops.
Signal service, cavalry, horses, Landsturm,

Captain ...

military police.
Captain ... Courses for officers and cadets of the infantry, pioneers (including pioneer searchlight units), columns and trains (including remount depôts and veterinary hospitals), drafts and recruit depôts, medical units, works companies, war maps.

Captain ... Order of battle on the Western Front,

situation with regard to the army on the Western Front, establishments, troops for the protection of the frontier and for coast defence, training, assault battalions, clothing, armament and equipment, mechanical transport, armoured cars, armoured trains, railways, files.

Section II.

Head of Section-Lieut.-colonel. Officer in charge of the registry-Captain.

Section IIa.

Major (Head Organization, employment and order of battle of the heavy artillery; observaof Section). tion groups and sound-ranging sections. Captain Questions regarding construction, employment of captured artillery.

Section IIb.

Captain ... Rear lines of defence, labour (labour bat-talions, prisoners of war battalions, civilian labourers), road-construction companies, gas troops, flame projectors, trench mortars, light pistols, pioneer stores, infantry armour, steel helmets.

Captain*... Economic questions as affecting war (in-

dustry, agriculture, labour questions in Germany), questions of supply (raw materials, &c.), questions of demobilization as affecting economic matters.

Captain*... Lessons of the war, artillery tactics, manuals of position warfare for all arms, survey.

* These officers work in co-operation.

Under O II. Mun. (Ammunition).

Heavy artillery and trench mortar ammu-Major nition. Field artillery and infantry ammunition. Major

Section B.

Head of Section-Colonel.

Operations of Army Group Scholtz, the Captain ... Second Bulgarian Army and the Turkish Armies; situation regarding operations in the Asiatic theatres of war, Bulgarian and Turkish affairs.

The forces operating on the Russo-Roumanian Front were formed in two German Groups of Armies and one Austrian Group of Armies. There was, however, a German Chief of the General Staff for the Army front of the Archduke Joseph.

The South-Eastern Group of Armies included the Army Group operating on the

Macedonian Front.

The German Army operating on the Italian Front in 1917/1918 was nominally under the Austro-Hungarian General Headquarters.

A Group of Armies (Heeresgruppe) consists of two to five Armies, and is commanded by

a Field-Marshal or General-Oberst.

7. Composition and Staff of an Army.—An Army (Armee) consists of three to six Corps, but this varies considerably on different sectors of the front. The average number of divisions in an Army on the Western Front is 15. An Army is usually commanded by a General-Oberst.

The forces operating in Lorraine and Alsace are grouped in Army Detachments (Armee-

Abteilungen), each of six to ten divisions.

The Staff of an Army in the field is normally divided into four sections (see Section IV.), under the Chief of the General Staff of the Army, as follows:—

- Section I.—General Staff (Generalstab).—Consisting of General Staff Officers. It is divided into the following sub-sections:—
 - I(a).—Operations, orders, order of battle, tactics, training, security. I(b).—Areas, movements, traffic regulations, road control, salvage.

I(c).—Intelligence, air service, signals.

- *I(d).—Ammunition supply (artillery and infantry).
- Section II.—A dministrative Staff (Adjutantur).—Consisting of one General Staff officer and several Adjutantur officers. It is divided into—
 - II(a).—Personnel, promotions, honours and rewards, leave, chaplains, lectures, regimental newspapers, supply, transport, clothing, boots, captured material.
 - II(b).—Organization, establishments, strengths, returns, billeting, replacing of guns, ammunition and horses, contre-espionage and censorship, graves registration, railway service.

II(c).—Interior economy, routine orders, returns.

- Section III.—Military Law (Feldjustizamt), under the Judge-Advocate (Kriegs-gerichtsrat).

 Provost-Marshal's duties, discipline, courts-martial.
- Section IV.—Intendance (Intendantur), medical and veterinary services, staffed by military officials, medical and veterinary officers.

IV(a).—Administrative details, rations, clothing, pay, allowances, requisitions, food-prices, local contributions, postal service, dealings with civilians.

IV(b).—Medical services, anti-gas measures.

IV(c) or IV(d).—Veterinary services.

In some cases Sections IV(b) and IV(c) have been formed into independent sections numbered V (Medical) and VI (Veterinary) respectively. In other cases Section IV(b)

^{*} This section is also controlled by the *Oberquartiermeister*, but it is sometimes under the control of I(b).

(Medical) has been retained, whilst the veterinary section has become Section V. In these cases Section IV(c) has become the Army Chaplain's Department.

Sections I(d), II, III and IV are directly subordinate to the Oberquartiermeister of the Army, but the work of all the sections is co-ordinated under the Chief of the General Staff.

The Generalstabschef of an Army corresponds to our Major-General, General Staff. The Oberquartiermeister corresponds to the Deputy Adjutant and Quartermaster-General of a British Army, but is an officer of the General Staff, and is subordinate to the General-stabschef. Administrative and routine orders are issued over the signature of the Oberquartiermeister.

In addition to the General and Administrative Staffs, there are various other technical

advisers and directors at the Headquarters of each Army:-

General of Artillery (General der Artillerie beim A.O.K.) who has under his orders two staff officers (Stoart), one for field, and one for heavy artillery.

General of Pioneers (General der Pioniere).

Ammunition Staff (Mun.).

Army Signal Commander (Akonach).*

Army Aviation Commander (Koft.).

Army Balloon Commander (Koluft).

Commander of Anti-Aircraft Guns (Koflak). Commander of Railway Troops (Kodeis).

Staff Officer for Machine Gun Troops (Stomag).

Staff Officer for Gas (Stogas)—sometimes included in IV(b).

Staff Officer for Survey (Stoverm).

Mechanical Transport Commander (Kdeur. d. Krftr or Akokraft).

Commander of Ammunition Columns and Trains (Kdeur. d. Mun. Kol. u. Tr. or Komut).

Staff Officer of Train (Stotrain).

Intelligence Officer (Nachrichten-Offizier)—sometimes included in I(c).

Labour Commandant's Office (A.V.B.)

Army Security Officer (Sicherungsoffizier).

Army Salvage Officer (Sammeloffizier).

Army Postal Officer (Armee Postinspektor).

Secret Police (Geheime Feldpolizei, "Pol").

Educational Officer (U.O.) in charge of propaganda.

Camp Commandant (Kdt. d. H. Qu.).

In addition, the following are placed directly under the orders of the Army Head-quarters:—

Inspector of Field Recruit Depôts. Army Meteorological Service.

Topographical Section.

There are also a number of attached officers, such as chaplains, &c.

The above gives a typical distribution of duties at the Headquarters of a German Army, but the details differ somewhat in the different Armies, and the functions of some of the sections have not yet been clearly established.

^{*} Has under him the Army Telephone Commander (Akofern) and the Army Wireless Commander (Akofunk). There is an Army Telephone Detachment (Aferna) and probably also an Army Wireless Detachment (Afunka).

Organization of the Staff of a German Army. Army Commander.

Chief of the General Staff. Administrative Staff. General Staff Branch (under the Oberquartiermeister).* (directly under C.G.S.). $\Pi'(a)$. $\Pi'(b)$. $\Pi'(c)$. Π . $\Pi'(a)$. $\Pi'(a)$ $\Pi'(b)$ $\Pi'(c)$. I (c). I (d). Military Medical. Establish-Movements Intelligence Ammunition. Operations Law. ments. and and and Intendance. Veterinary. Interior Personnel. Billeting. Signals. Training. Economy.

The headquarters staff of an Army comprises about 50 staff officers and 40 officials.

8. The Staff of a Corps.—The organization of a Corps staff is similar to that of an Army staff as given above, and is divided into the same sections, I, II, III and IV.

A captured document, dated March, 1918, gave the complete composition of the XVII Corps Headquarters and the number of officers and officials on the staff of the divisions and brigades under its orders as follows:—

	I.—XVII Corps Headquarters.		
	General Officer Commanding (v. Webern)		1
-	General Staff (Generalstab: Chef, Ia, Ib, Ic, Id, Qu)		6
	Routine Staff (Adjutantur: IIa, IIb)		2
	Orderly Officers (Ordonnanz-Offiziere: OI, OII, OIII, OIV, OV)		5
	Artillery Section (Abt. Artillerie)	•	. 4
	Munitions Section (Abt. Munition)	••	2
	Survey Section (Korpsmessplan: IId)		2
	Engineer Section (Abt. Pioniere)	••	1
	Camp Commandant (Korps-Hauptquartier)		3
	Registry (Registratur)	••	1,
	Military Police (Feldgendarmerie)	••	1
	Quartermaster-General's Branch (Feldkorpsintendantur)	• • • • •	4
	Cashier's Office (Feldkriegskasse)		1
	Supply Office (Korpsproviantamt)	• •	
	A.D.M.S. (Korpsarzt: IVb)	- • • · · · ·	5
	A.D.V.S. (Korpsveterinär: IVc)		1
	Judge Advocate (Feldjustiz: III)		1
	Field Post Office, No. 929 (Feldpostamt)		5
	8th Group Aviation Commander (Gruppenführer der Flieger 8)	• •	2
	Mosaic Office (Gruppenbildstelle)		1
	617th Group Signal Commander (Gruppen-Nachrichten-Kdeur	317)	5
	617th Group Telephone Petachment (Gruppen-Fernsprech-Abt.	617)	6
	505th Group Wireless Detachment (Gruppen-Funker-Abt. 505)	31 • r • - 13	1
	Group Map Office (Gruppen-Kartenstelle)	• •	1
	Total		62
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^{*} The Oberquartiermeister is a senior General Staff Officer,

II.—Divisional Headquarters.

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13th Landwehr Division		• •	••	2.5	z 's	d	04.1.1.7	24
36th Division) (1. -11)	A Green	a••@ia		in dust	o salenn		27
103rd Division	1.0	earig A	4.4(13)	tion (20.00	• •		20
9th Division		••			• •	• •	• •	30
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II	I.— <i>Br</i>	igade H	Teadqua	rters.				
60th Landwehr Brigade (1								4
71st Infantry Brigade (36)	h Divis	sion)	• • •		ing . Ed.	de de de	. • • i e	4
	n,						an chap	
205th Infantry Brigade (1					gje i tur	. • • • · · · · · · · · · · · · · · · ·		3
18th Infantry Brigade (9th	n Divisi	ion)		• •	L. • • . L	• •	••	3

9. The Staff of a Division.—The staff of a division is, naturally, much smaller than that of an Army or Corps; the system is similar in principle, but less complicated in detail. A captured document, dated August, 1918, gives the organization and distribution of duties of the Staff of the 117th Division as follows:—

1st General Staff Officer I(a).—Captain.—Operations, training, co-operation with artillery commander and pioneer commander. The 1st General Staff Officer I(a) acts as Chief Staff Officer to the Divisional Commander, and exercises general supervision over the other Sections of the Staff.

Section I.—

2nd General Staff Officer.—Captain.—Tactical matters (under instructions of I(a)), communications (with divisional signal commander), aviation and balloons, billets, special reports, maintenance and improvement of trenches, movements, security.

1st Orderly Officer (O.I.).—2nd lieutenant.—Daily reports, order of battle, secret files, secret register of Section I, cypher, opening of correspondence (except secret and personal letters, which are opened by I(a)) war diary, reports on operations, supervision of routine in Section I.

Officer in charge of Rear Supplies (I(b)).—Captain with assistant (2nd lieutenant).— Employment of columns and trains, rear supplies, supply of material, remounts, vehicles, arms, ammunition (artillery and infantry), town majors, civilians, passports, control of printing, dumps of stores and tools, Army orders.

2nd Orderly Officer (II(d)).—2nd lieutenant.—Daily situation maps, supervision and keeping up of all maps, air photos, intelligence and patrol reports, intelligence summary (daily, if possible), prisoners, press, supervision of divisional topographical section, situation maps of other theatres of war.

Section II.—

Divisional Adjutant.—Captain.—Officers (questions regarding), supply of personnel, strength returns, nominal rolls, casualties, pensions and medical boards (with Section IV(b)), leave, commands, postings, discipline, honours and rewards, graves, legal matters (with Section I!I), spiritual welfare (with the Divisional Chaplain), post, divisional routine orders and staff instructions, secret correspondence register, supervision of clerks, orderlies and cyclists.

Section Pi .-

Commander of Pioneers.—Captain.—Technical adviser to the divisional commander on all pioneer matters.

Employment of the units under his orders, co-operation of \ with pioneers with infantry and artillery, pioneer work in trenches. \ Section I(a). Ammunition supply for T.Ms., explosive charges, grenades and other imple-

ments of trench warfare, road construction, pioneer dumps, technical workshops.

Section Divkonach—

Commander of Divisional Signals.—Captain.—Employment of all means of communication with Section "I." supervision of all signal service units within the division replacement of signal stores, light signals.

Section G.O.—

Anti-Gas Officer, at the same time Salvage Officer.—2nd lieutenant.—Anti-gas measures, forward zone meteorological service, salvage.

Section III.—Under an official of the Judge-Advocate's Department -a Kriegs-gerichtsrat.—Courts-martial, wills, inquests in cases of fatal accidents, judicial questions, legal advice.

Section IV(a)—

Intendantur, under a Feldintendanturrat.—Supplies, accounts, clothing, administration, agriculture, economic organization, presents for troops, special measures of rationing, &c., with I (a) adviser of divisional commander in all matters re supplies and administration.

The Intendantur (Feldintendantur) and the Supply Office (Proviantamt) are

under his orders.

Section IV(b)—

Divisional medical officer (Oberstabsarzt).—Supervision and control of all medical and sanitary questions, medical arrangements in connection with operations with Section I(a), questions affecting medical personnel, anti-gas measures (with the Gas Officer), adviser to the divisional commander on all medical and sanitary questions.

Section IV(c)—

Divisional veterinary officer (Oberstabsveterinär).—All veterinary matters, personal questions affecting veterinary officers.

Stabs. Qu.—

Camp Commandant.—2nd lieutenant.—Billets, protection, rations, supervision of the divisional headquarters transport by road or rail, town commandant (if the division is billetted separately), discipline at divisional headquarters.

Gr. Tross. D.U.O.—

Officer in charge of the second line transport of the division, at the same time Education Officer.—Captain.—Horsemastership, shoeing, vehicles and harness; this officer supervises the loading of the second line transport whenever concentrated; all educational matters, postal censorship.

Po-

Field post (Feldoberpostsekretär) (with Section II).

The divisional artillery commander has 1 staff officer (Adjutant) and 3 orderly officers. An infantry brigade headquarters comprises the brigade commander, 1 staff officer (Adjutant), 2 orderly officers and 1 chaplain.

Other captured documents of various dates show in general a similar organization, but differ in certain details.

10. The chain of command in the field.—The Army Corps of two divisions, which, in peace, formed the unit of higher command, has not proved a suitable formation under war conditions. The unit of strategic manœuvre has become the division, and the divisions have in practically all cases become entirely independent of their original Corps grouping. Corps staffs normally remain semi-permanently in a sector after the divisions composing the Corps have been transferred elsewhere. In the field, three or four divisions are usually grouped under one Corps staff.

During the Somme battle of 1916, when divisions had to be relieved frequently, semipermanent "Groups" were formed in the First and Second Armies. Each Group held a definite sector of the front with two, three or four divisions in line. These Groups were similar to our Corps, and this system has now become general on all sectors of the front.

In an infantry division, the chain of command has been considerably simplified by the

reorganization of all divisions on a three-regiment basis.

The divisional commander issues his orders to:-

(a.) the infantry brigade commander,(b.) the divisional artillery commander,

who respectively command all the infantry and artillery units (including heavy artillery) operating in the divisional sector.

CHAPTER V.

INFANTRY.

1. Infantry organization.—The German infantry is organized in regiments of three battalions. As stated in Chapter III, a division comprises three infantry regiments grouped

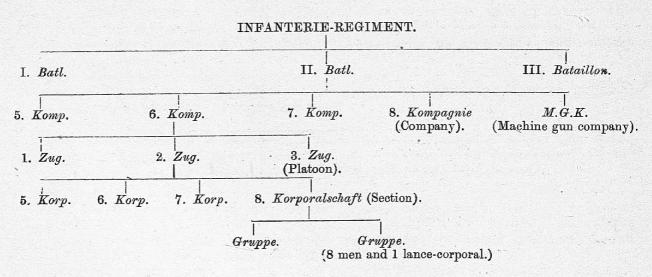
under an infantry brigade staff.

There are still some independent battalions, such as Jäger, Schützen, and cyclist battalions, but the tendency has been to combine all independent battalions into regiments. The Jäger (Rifle) battalions, one of which was originally attached to each Corps, consisted of specially picked men. They wear a distinctive grey-green uniform and shako.

During 1916, most of the Jäger battalions were combined to form Jäger regiments, and

in 1917, a Jäger division was formed to take part in the Italian campaign.

2. Organization of an infantry regiment.-



The above diagram shows the chain of command in an infantry regiment. The three battalions of the regiment are numbered I, II and III. Each battalion consists of four companies and a machine gun company; the companies are numbered from 1 to 12

throughout the regiment; the machine gun companies are numbered 1, 2 and 3. A company is organized in three platoons, numbered 1, 2, 3 in each company. Each platoon (Zug) is divided into four sections,* numbered from 1 to 12 throughout the company. The smallest subdivision is the group (Gruppe) of 8 men and a lance-corporal.

Each company has four stretcher bearers (Krankenträger).

The organization of a machine gun company is given on page 67.

The various units are nominally commanded as follows:-

Regiment by a colonel (Oberst), with a Lieut.-Col. (Oberstleutnant) as second-in-command.

Battalion by a major (Major).

Company ,, captain (Hauptmann).

Platoon ,, lieutenant (Oberleutnant) or 2nd Lieut. (Leutnant).

Section ,, corporal (*Unteroffizier*). Squad ,, lance-corporal (*Gefreiter*).

In practice, a regiment is now usually commanded by a major, a battalion by a captain, a company by a subaltern, and a platoon by an Offizierstellvertreter or Vizefeldwebel.

The war establishments (excluding machine gun companies) are shown in the following table:—

	Officers.	Medical officers and paymasters.	Other ranks.	Horses.	Vehicles.
Company	5 23* 73 4†	3 10 1	259 1,050 3,204 54	10 59 193 16	4 19 59 2

^{*} Includes a supply officer (Verpflegungs-Offizier). † Includes a transport officer (Bagage-Führer).

According to a Prussian War Ministry Order of the 12th March, 1917, it was intended to reduce the strength of a battalion to 750 other ranks, of whom 100 were to be $g.v.\dagger$ or $a.v.\ddagger$ men. This reduction in establishment was to be carried into effect consequent on the issue of 3 light machine guns ('08/'15 pattern) to each infantry company.

Previous to the German offensive of the 21st March, 1918, the High Command had fixed the total establishment of an infantry battalion at 980 men (including the machine gun company). This establishment was reduced with effect from the 1st July, 1918, to 880 men (750 men for the four companies, and 130 men for the machine gun company). In the Autumn of 1918 the strength of a German infantry battalion was estimated at 20 officers and 650 other ranks, excluding the machine gun company.

According to a number of recently captured documents, a German infantry company, at full strength, is normally organized as stated in the following table:—

^{*} The Korporalschaft is an administrative, not a tactical unit; there are now usually only three Korporalschaften in a platoon owing to the reduction in company strengths.

[†] g.v. Garnisonsverwendungsfähig = fit for garrison duty. ‡ a.v. Arbeitsverwendungsfähig = fit for labour employment,

ing Campung pool (1994)1969 ibis 1987 - Bangar - Adamay Campula C	uri a S. I ber. Far fi bari	Approximate a	verage strength.	
Distribution.	Officers (Offiziere, Off. Stell., Feldw. Lts.).	Non-commissioned officers (Feldw., Vizefeldw, Serg., U/Off.).	Lance-corporals and privates (Gefr., Gemeine).	Total other ranks.
(i.) Company headquarters	1	San San San San	5	5
(ii.) 3 platoons— 1st platoon (3 groups) 2nd platoon (3 groups) 3rd platoon (3 groups)	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	5 5 5	24 24 24	29 29 29
Trench strength (Grabenstärke)		-17		92
gallegeran a yel musleffisi salam general gener Period		- ·		+
 (iii.) Men in the trenches, not included in trench strength— (1.) Light Minenwerfer detachment (2.) Signallers 		1 1	7	8 13
Rifle strength (Gewehrstärke)	e de la composition			113
(3.) Stretcher bearers			4	4
Total fighting strength	2	17	100	117
(i.) Employed within the company (ii.) Employed—	<u> </u>	3	18	21
(1.) Outside the company, but within the battalion.		3	10	13
(2.) Outside the battalion, but	1	2	10	12
within the regiment. (3.) Outside the regiment		1	10	11
(iii.) Temporarily detached (courses of instruction, &c.). (iv.) Sick (v.) On leave	1	4	9	18
	J	10		to.
Total detached for duty	2	13	57	70
Field strength (Feldstürke), or total for the company (Gesamtstärke).	4	30	157	187

^{3.} Transport.—The transport of a regiment of 3 battalions at war establishment, exclusive of the machine gun companies, consists of 16 led horses, 58 two-horsed vehicles, and 1 four-horsed vehicle, and is organized thus:—

Transport of a regiment.

1st Line Transport (Gefechts-Bagage)—

16 led horses (1 per company and 4 for regimental staff).

12 small-arm ammunition wagons (1 per company).

12 travelling kitchens (1 per company).

3 infantry medical store wagons (1 per battalion).

Train ‡ (Grosse Bagage)—

- 16 baggage wagons (1 per company, 1 per battalion staff and 1 for regimental staff).
- 12 supply wagons (1 per company).
 3 sutlers' wagons (1 per battalion).

1 tool wagon (four-horsed).

All infantry transport wagons are four-wheeled, drawn by two horses (except the tool wagon) and painted grey. They are driven from the box and, with the exception of the small-arm ammunition wagons and travelling kitchens, are made up of a body only, with a fore-carriage which locks under. The small-arm ammunition wagon is composed of two boxes, rigidly connected by futchells, and carries 14,400 rounds, or about 70 per rifle.

Transport of a battalion.

(Without machine gun company).

1st Line Transport (Gefechts-Bagage)—

4 led horses.

4 company small-arm ammunition wagons.

4 travelling kitchens.

1 infantry medical store wagon.

Train (Grosse Bagage)—

1 baggage wagon for battalion headquarters.

4 company baggage wagons.

5 supply wagons (including 1 sutler's wagon).

Transport of a Company.

1st Line Transport (Gefechts-Bagage)—

1 led horse.

1 company small-arm ammunition wagon.

1 travelling kitchen.

Train (Grosse Bagage)—

1 company baggage wagon.

1 company supply wagon.

4. Regimental specialists.—During 1915 and 1916, the requirements of trench warfare caused a number of specialist companies, detachments and sections to be attached to infantry regiments. Artificers and men with special trade qualifications were selected from the battalions of the regiment and formed into regimental pioneer companies, entrenching and tunnelling companies, concrete construction sections, &c.

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[‡] According to a captured document, a light 2-wheeled telephone cart has been added to the transport of an infantry regiment. It is not certain whether this is an authorized was establishment.

As the formation of these unauthorized units reduced the company rifle strength considerably, the practice was discouraged, and regular units were formed for carrying out special duties of this nature. The experiences of the 1916 campaign, however, led the Germans to organize, internally within each infantry regiment, three special units, viz.:—

(a.) Light machine gun sections, two per company, each consisting of 3 light machine guns ('08/'15 pattern) (see page 66).

(b.) Minenwerfer companies, one per regiment, each consisting of 9 light and 3 medium Minenwerfer (see page 122).

(c.) Signalling detachments (Nachrichtenabteilungen) of varying strengths (see page 132).

The men forming these units are not supernumerary to the regimental establishment, but remain on the nominal rolls of the companies from which they are drawn.

5. Cyclist units.—Prior to mobilization, the only cyclist units in the German Army were the cyclist companies of Jäger battalions. Each of these battalions had one, and in some cases two, cyclist companies.

During the war, a number of new cyclist companies have been formed, and, by the end of 1918, about 150 were in existence. Some of the new divisions formed during the war have been provided with divisional cyclist companies, and a few of the cavalry divisions are also provided with cyclist companies.

A number of cyclist companies have been grouped into cyclist battalions, of six companies each. These units first appeared in September, 1916, when five cyclist battalions were formed. A sixth was added in July, 1917, and a seventh in October, 1918.

All the cyclist battalions are now grouped together in a Cyclist Brigade, which made its first appearance in Roumania in November, 1916, and was subsequently employed in guarding the Dutch-Belgian frontier. The Cyclist Brigade, in conjunction with a composite cavalry division, covered the German retirement to the "Hindenburg Line" in March, 1917, and took part in the operations at Oesel and in Finland from October, 1917, onwards. In October, 1918, the brigade was transferred to the Western Theatre and took part in heavy fighting on the Cambrai—St. Quentin battle front. It now consists of 6 battalions, the 3rd Cyclist Battalion having been dissolved.

The war establishment of a cyclist company is as follows:—

War establishment of a cyclist company.

			Officers.	Other ranks.	Vehicles.
Company commander Lieutenants Feldwebel Vizefeldwebel		•••	1 2 	1 2 12	···
Unteroffiziere or Oberjägen Armourer, non-commission	ed officer	••	••	1	
Lance-corporals Privates		:	**************************************	11 111	•
Cavalry or Train non-comm	nissioned of	ficer		1	•••
Medical corporal Train privates ,,			••	7	• •

	Officers.	Other ranks.	Vehicles.
Mechanical transport drivers Touring car			+ 11 03 1000000 - 12 1 1 1 1 1 2 2 2 2 1 1 1 1 1 1 1 1 1
Total	3	150	module of 6 to James 2

6. Mountain units.—In peace, a few Jäger battalions were trained annually in mountain and winter warfare. During the war, four ski battalions were formed in

Bavaria, and one ski battalion in Württemberg.

The 1st, 2nd, 3rd and 4th Ski Battalions form the 3rd Jäger Regiment in the Alpine Corps. These battalions were formed in the spring of 1915, and were sent to the Trentino. They were afterwards employed in Serbia, and in the spring of 1916 were transferred to the Western Front, where they took part in the battle of Verdun. In August, 1916, they went to the Carpathiaus, where they were attached to the 200th Division.

The Württemberg Ski Battalion (Württembergisches Gebirgs- und Schneeschuh-Bataillon) fought in the Vosges until October, 1916, when it was transferred to Transylvania. In the spring of 1917 the battalion returned to the Vosges. Later, it was sent to Roumania, and arrived on the Italian Front in November, 1917. Early in 1918 it returned to the

Western Front, where it was raised to the status of a regiment.

Mountain units wear a grey uniform with green facings and twisted cord on the shoulders, similar to that worn by foresters. The stand and fall collar bears the letter "S" on either side. A mountaineering cap, similar to the Austrian, is worn, with two cockades in front and an Edelweiss badge at the side. Ankle boots and puttees are worn.

7. Assault detachments.—A noteworthy feature of infantry organization has been the introduction of "Assault Detachments" (Sturmtrupps). These units consist of picked men whose initiative and skill in attack are developed by special training. Assault detachments were first used in the Verdun fighting, and the idea was subsequently much developed.

During the latter part of 1916 an assault company (Sturmkompagnie) was formed in a number of divisions. An assault company usually consists of 1 officer and about 150 men; the company is organized in 3 platoons, one of which is often attached to each regiment of the division. These units are mainly employed in patrolling, and in carrying out trench

raids and offensive operations.

In almost all the German Armies an assault battalion (Sturmbataillon) was formed during 1917 or early in 1918.

Assault battalions usually comprise—

4 assault companies.
Infantry gun battery.
Light trench mortar detachment.
Light flame-projector detachment (Kleif-Trupp).
Machine gun company.
Park company.

The men of assault battalions are known as "Grenadiers." They wear Litzen (see page 18) and puttees.

Of the 19 assault battalions formed during 1917-18, five are now known to have been

reduced to the status of assault companies.

When not employed in special offensive operations on the front, assault battalions act as schools for training divisional assault units.

8. Armament.—(a.) General.—The following table shows how infantry personnel are armed:—

Sword and '08 automatic pistol	Officers, medical officers, officials, serjeant-majors, ensigns and vice-serjeant-majors.
Short side-arm	Drummers, buglers, bandsmen, officers' servants, and medical personnel.
Short side-arm and '98 carbine	Transport drivers.
Short side-arm and '98 carbine or '08 pistol	Personnel of machine gun units.
Short side-arm and '08 pistol	Light machine gun teams.*
Short side-arm and '98 rifle	Other ranks.†

^{*} A proposal to arm the Nos. 1 and 4 of light machine gun teams with carbines instead of pistols was vetoed on account of the shortage of carbines.

† It is proposed to arm trench mortar personnel with carbines instead of rifles.

The four company stretcher bearers are armed with rifles, but do not take them into action.

(b.) The rifle.‡—The '98 pattern rifle is made on the Mauser system: calibre, '311-inch (7.9-mm.); weight, empty, without bayonet, 9 lbs. 3 ozs.; length, 48.6 inches; length of barrel, 29.05 inches; number of grooves, 4; width of groove, '153 inch; depth of groove, '0049 inch; twist of rifle, right-handed, 1 in 30.2 calibres (1 turn in 9.39 inches); maximum rate of fire obtainable, 35 to 40 rounds per minute.

The left side of the body is cut down flush with the bottom of the bolt recess and, therefore, level with the top of the magazine. This enables all the cartridges to be pushed into the magazine with the flat of the thumb, and avoids the necessity of pressing the last

cartridge in the charger home with the point of the thumb.

The cartridges are held together by a grooved charger or strip (falzartiger Halter oder Ladestreifen), which grips the bases only, and falls out when the breech is closed after the five cartridges have been put in. They, therefore, lie free in the magazine, and single cartridges can be put in at any time. There is no cut-off.

The cartridges are arranged in two vertical rows, one of three, the other of two rounds,

close against each other, so that the magazine is small and entirely in the stock.

A certain number of detachable magazines (Ansteckmagazin) holding 25 cartridges were issued during 1916 with the object of providing an increased volume of fire. Rifles fitted with these magazines are awkward to handle and are only suited for certain phases of trench warfare. The issue of these magazines was discontinued.

The extractor consists of a piece of spring steel extending a little more than half the leugth of the bolt. It is dovetailed on to a ring of steel which works in a cannelure near the fore-part of the bolt.

The platform is actuated by a W-shaped spring of ribbon steel. The bottom of the magazine dovetails into its seat and is secured by a stud and spring. It is easily removed

The bolt is a single steel forging with no separate bolt-head. It is retained in the body by a stud on the left, and is removed by pulling out a hinged spring shutter to which the ejector is attached. The bolt is provided with an extra lug engaging in a recess in the cylindrical part of the rear end of the body. On the bolt is a small rib which acts as a guide in withdrawing it. The rib lies underneath the extractor and supports it when the bolt is closed. The bolt can be stripped without tools.

The bands are secured by means of spring catches. The rear end of the bolt is provided with a safety catch, which is manipulated by the thumb and forefinger from left to right, and can only be used when the mainspring is

compressed.

The backsight consists of—

(i.) The bed, which is graduated for 200 metres* and for every 50 metres from 300 to 2,000, and has a series of notches cut on either side. Those on the left side give the elevation for hundreds of metres, and those on the right for the intermediate fifties.

(ii.) The sliding-piece, which is provided with spring clutches to engage in the

notches, and a pointer.

(iii.) The girder-shaped leaf, which is of unusual strength, and is supported by the sliding-piece.

The foresight is a barleycorn, dovetailed into its block at right angles to the axis of the barrel.

Three rifles fitted with telescopic sights are issued to every infantry company.

Various patterns of periscopic sights have also been tried.

Detachable luminous sights (backsight and foresight) are issued for use with the They consist of a "bead" of luminous paint and a V-shaped backsight service rifle. defined by a line of luminous paint.

A detachable, nickel-plated, steel muzzle protector, 2 ozs. in weight, is also issued.

A breech cover made of sheet iron was issued during 1918. It consists of a light stamping, which fits over the breech and is secured to the bolt lever by a clip. On the left of the cover is a wire rod, which slides in a steel tube. The latter is fixed to the side of the stock by means of a spring clip. When the bolt is operated the breech cover moves with it.

(c.) Automatic pistol.—The '83 pattern revolver has been replaced by the '08 automatic pistol.

This pistol takes eight cartridges, has a calibre of 354 inch (9 mm.) and weighs

1.8 lbs. (835 grammes). The length of its bore is 122 mm.

The length of the cartridge is 29 mm., weight 12.5 grammes, and weight of charge ·35 grammes. The bullet has a blunted point and weighs 8 grammes.

The maximum range is 1,640 yards, and the velocity at 40 feet from the muzzle is 984 f.s.

A later pattern, the '08/'15 pattern automatic pistol, was issued to the light machine gun personnel in January, 1918. The reserve personnel carries the carbine or the 1888 (?) rifle.

Characteristics.—Automatic pistol; calibre, '354-inch (9-mm.); total length, with detachable butt, about 15\frac{3}{4} inches (40 cm.); bullet with lead core and iron envelope; cartridge case, stamped sheet brass; sight graduated up to 800 metres; the pistol is carried in a holster with flap slung over the left shoulder, and hangs over right-hand trouser pocket. Magazines are of two patterns; one holds 8 cartridges and fits into the grip, the other is a drum-shaped magazine holding 32 cartridges. A filler is issued for loading magazines. A spare magazine drum is carried in a canvas cover and is hung on the left side of the belt. Magazine drums are also issued in a special black japanned tin box containing 6 drums and a filler. At 800 metres the bullet will pierce a steel helmet.

There are two patterns of the '08/'15 automatic pistol, which merely differ as regards the safety catch; '08/'15 a/A. with the ordinary safety catch, and '08/'15 n/A. with a safety catch which allows of the breech being opened (to see if there is a round in the

chamber) with the pistol set at safety.

(d.) 1918 pattern automatic pistol-gun (Maschinen-Pistole 18, 1. or M.P. 18.1).— The pistol-gun, manufactured by Bergmann (see Plate 14), is a light, handy weapon, suitable for short bursts of fire at close range. It is not intended as a substitute for the light machine gun.

Characteristics.—Calibre, 354-inch (9 mm.); weight, without drum, 9 lbs. 6 ozs.;

rate of fire, 32 rounds in $3\frac{1}{2}$ seconds; total weight, with filled drum, 2 lb. 2 oz.

Description.—The gun is recoil operated and air cooled. It is fed from a feed drum or magazine, holding 32 rounds of German automatic pistol ammunition, which is attached to the left side of the gun opposite the ejection opening on the right.

The barrel is 8 inches long, and is protected by a casing through which numerous

holes are drilled to allow of a free circulation of air.

The gun is sighted for 100 and 200 metres. The barrel and mechanism are attached to a wooden stock by means of a hinge at the fore-end and a thumb-catch operated by the mainspring at the rear end. A leather sling, attached to the stock and to the barrel casing, is provided for carrying purposes.

(e.) Anti-tank rifle.—This rifle (see Plate 13) resembles the ordinary German '98 pattern Mauser rifle, but is larger in every way and has no magazine. The German designation of this rifle is 13 mm. Tank- und Fliegergewehr (abbreviated to Tufgewehr), or 13 mm. anti-tank and anti-aircraft rifle; similarly, the ammunition is known as Tufmunition. The following are the chief particulars:—

Calibre ·530 inch (13·5 mm.). Length 5 feet 7 inches. . . Weight . $37\frac{1}{2}$ lbs. Mounting On bipod, 1 foot high and $1\frac{1}{2}$ lbs. in weight. Range .. Sighted to 500 metres. Riffing— Number of grooves Width of lands ·062 inch. Depth of lands · (109 inch. Twist Right-handed, 1 turn in 16 inches.

Rate of fire Very slow.

Bullet— Armour-piercing, similar to that for the '98 Nature pattern rifle. 2.48 inches (63 mm.). Length 794.46 grains (51.48 grammes). Weight 200.46 grains (12.99 grammes). Propellant 1,783 · 81 grains (115 · 59 grammes). Weight of complete round ..

Each anti-tank rifle is served by two men; one of them carries and handles the rifle and carries 20 rounds of ammunition in a grey canvas pouch, the other carries 112 rounds of ammunition, 40 in two pouches and 72 in a box.*

(f.) Bayonet.—The latest pattern bayonet used with the '98 rifle is about 18 inches (46 cm.) long.

The weight of the bayonet and scabbard is $1\frac{1}{4}$ lbs.

9. Ammunition.—The following types of ammunition (calibre '311-inch) are used with the German '98 pattern rifle, the '08, '08/'15 and '08/'18 (heavy and light) machine guns, and the Bergmann, Madsen and Parabellum machine guns:-

(a.) "S" Ammunition (Spitz-Munition; Spitze=point).

The bullet is pointed in shape. It is 1:10 inches (28 mm.) in length, and tapers down to a diameter of only 05 inch (1.25 mm.) at the point, so that only 3 inch of the bullet touches the bore of the rifle.

The bullet is made of lead, with an envelope of steel coated with cupro-nickel, and is slightly cupped at the base. It weighs 154.32 grains (10 grammes). The cap of the

brass cartridge-case is edged with black lacquer.

The powder consists of graphited nitro-cellulose in flakes. The weight of the charge

is 48.4 grains (3.06 grammes).

The muzzle velocity is stated to be 2,821 f.s. as against 2,034 f s. with the '88 pattern

ammunition formerly in use. (b.) Heavy "S" Ammunition (schwere Spitz-Munition or s.S.M.).—A circular issued by German G.H.Q., dated the 28th July, 1918, announced the experimental issue of a heavier type of bullet designed for indirect machine gun fire at long ranges. Machine gun belts filled with this ammunition have been captured. This bullet is 17 inch (4.3 mm.) longer than the ordinary "S" bullet, 43.2 grains (2.8 grammes) heavier, and the cartridge case contains 2.3 grains (0.15 grammes) less propellant. The cap of the brass cartridge case is edged with green lacquer.

The bullet is very pointed in shape and has a tapered base. It is 35.1 mm. long; calibre, 7.9 mm.; diameter of base, 6.98 mm. Like the "S" bullet, it consists of a lead core coated with cupro-nickel, and is cupped at the base. It weighs 197 5 grains (12.8 grammes). The weight of the charge is 44.8 grains (2.91 grammes), i.e., the same

as the charge employed with the armour-piercing bullet.

This ammunition differs (c.) "R" Ammunition (Rillen-Munition; Rille=groove). from the ordinary "S" ammunition in the following particular:-

A shallow groove about 1 mm. wide, into which the cartridge-case is crimped, is cut round the lower end of the bullet. The object of this groove is to obviate stoppages

^{*} In July, 1918, anti-tank rifles were issued down to companies at least. These are believed to be trench stores.

caused by loose cases. According to an official document, all bullets of the "S" type will in future have this groove.

(d.) Armour-piercing ammunition (K-Munition or S.m.K.; Spitz mit Kern;

The envelope, instead of being filled with lead, contains a hardened steel core set

in lead.

Externally this ammunition is almost exactly similar to the "S" ammunition, the only distinguishing features being a somewhat blunter point, a red lacquer edging round the cap of the cartridge, and usually the letter "K" on the base instead of "S." The actual bullet is, however, considerably longer, though the portion projecting beyond the cartridge is the same length. Length of bullet, 1.46 inch (37.1 mm.); weight of bullet, 179.8 grains (11.65 grammes); weight of charge, 44.8 grains (2.9 grammes). This "K" ammunition is used against aircraft, loophole plates, &c., and particularly against tanks.

- (e.) Armour-piercing tracer ammunition (L.S. Munition; L.S.=Leucht-Spur or Licht-Spur=luminous trace).—Similar externally to the armour-piercing bullet; there is a red lacquer ring round the cap of the cartridge case, but to distinguish this ammunition from the ordinary armour-piercing ammunition the point of the bullet is blackened for a length of '39 inch (10 mm.). The forward half of the envelope of the bullet contains a steel core set in lead, the rest being filled with tracer composition. The base is closed by a brass washer, through which appears the igniting mixture. This bullet traces up to about 600 yards.
- (f.) Explosive ammunition (L.E. Munition; L.E. = Luft-Einschiess = aerial ranging.)—The bullet is similar in appearance to the old-fashioned round-nosed bullet, except that it is longer and the nose is pierced by a small hole to act as a gas escape. The explosion is caused by an igniting device actuated by the shock of discharge, and takes place in less than one second after firing, at a range of about 300 yards. The bullet produces a puff of white smoke on bursting and is intended for ranging purposes. It has been discarded.
- (g.) Incendiary tracer ammunition (Brand-Munition).—The bullet is more tapered, i.e., is flatter on the shoulder than the armour-piercing bullet, and the tip is blunter. The bullet consists of a steel envelope, coppered inside and outside, the forward portion of which is filled with yellow phosphorus. It is closed by a lead plug. The base of the bullet is painted red. and at the side of the bullet is a filling hole closed with solder. In a complete round this hole is not visible. As regards the cartridge-case, the rim of the cap is painted black.

It would appear that this bullet has been designed primarily for incendiary effect, but

it traces after about 30 yards and remains tracing for about 500 yards.

(h.) The old round-nosed bullet is still sometimes met with.

Loading clips are made of iron coated with zinc. A clip holds five rounds.

(i.) Cartridge-cases.—In November, 1918, brass cartridge cases were still in use, but a considerable proportion of ammunition was issued with coppered steel cases owing to the shortage of copper. The latter type were at first issued for use with rifles only, but at the cessation of hostilities it was also fired from machine guns, in spite of the fact that, owing to the expansion of the steel case and the frequent occurrence of split cases, steel cases proved wholly unsatisfactory.

10. Distribution of ammunition.—The following is the distribution of ammunition in the field:-S

	Number of round
Carried on the soldier	per man 150 70 some 155 20
Total	395

Formerly, cartridges were made up in clips of five, three of which formed a packet (Schachtel); 15 packets (225 rounds) were put up into a box weighing, packed, 16.97 lbs., and 64 of these were carried in each company ammunition wagon, which thus held 14,400 rounds, weighing 1,069 lbs.

The most recent practice as regards rifte ammunition is for the cartridges to be made up in clips of five, 14 of which (70 rounds) are contained in a cotton bandolier; four bandoliers are packed in a cardboard box, and five of the latter in a wooden box, weighing $91\frac{1}{2}$ lbs.

As regards machine gun ammunition, this is packed in cardboard boxes containing 15

rounds each.

11. Grenades.†—(a.) Rifle grenades.—The older patterns of rifle grenades were fitted with a rod or tail. Their manufacture was abandoned owing to their want of accuracy.

The new pattern closely resembles the Vivens-Bessières grenade in use in the French Army. It is fired out of a cylindrical cup or discharger attached to the service rifle,

using ordinary ball ammunition.

The grenade is cylindrical in shape and is bored centrally to permit the passage of the

bullet. It weighs 1 lb.

The cup is $11\frac{1}{8}$ inches in length, the cylindrical portion being $5\frac{1}{8}$ inches long, with an interior diameter of $2\frac{3}{8}$ inches. Near the bottom is a ledge to carry the grenade. The stem of the cup, 51 inches long, slips over the muzzle of the rifle, and is secured by a collar.

The maximum range of this new rifle grenade has been found by trial to be about

210 yards.

(b.) Hand grenades.—The following are the types in general use:—

The "Cylindrical grenade with handle" (Stielhandgranate), sometimes known as the "jam-pot and stick grenade." This is a time grenade $(5\frac{1}{2}$ secs.). It would appear from captured orders that this grenade with a

short-burning fuze (2-3 secs.) is issued to "assault" troops.

The "Egg grenade" (Eierhandgranate). This is a small time grenade of the shape, and about the size, of a hen's egg. It weighs only 11 oz. and can be thrown about 50 yards. The bursting charge, consisting of a mixture of black powder, potassium perchlorate, barium nitrate and aluminium powder, is explode by a time fuze fitted with a friction lighter. The effect of this bomb is small and very local. Duration of burning, 8 secs. when fired from a thrower, 5 secs. when intended to be thrown by hand.

† See "Instructions on Bombing," Part I. (S.S. 182).

^{*} The infantry and heavy ammunition columns have now been reorganized.

(c.) Gas and smoke grenades.—Gas and smoke grenades have never been employed by the Germans to any great extent. The type occasionally met with consists of a spherical iron container about 4 inches in diameter, made of thin sheet iron and containing about two-thirds of a pint of liquid, which is scattered by the explosion of a small charge of black powder. The liquid is sometimes in a porcelain container. The usual friction igniter (time) is used. The following types are known; these differ merely by the nature of the liquid filling:---

Handgasbombe "B," marked "B" in red lettering; contents, mono- and di-bromethyl-

ketones; nature, lachrymatory.

Handgasbombe "C," marked "Gas C" in red lettering; contents, methylsulphuric

chloride; nature, lethal and lachrymatory.

Gasstielgranate, "BZ," marked "G" in blue lettering. Effect similar to that of "Blue Cross" gas shell, viz., partly high explosive and partly gas.

Reizgasbombe "R," marked "R" in red lettering.

Nebelbombe "N," marked "Nebel"; contents, "N" Stoff, i.e., chlorsulphonic acid; produces an opaque white cloud of very heavy smoke, which clings to the ground. The smoke is an irritant, but is not poisonous.

(d.) Portable flares.—The infantry are issued with a ground flare (Flammenfeuer) and a torch flare (Magnesiumfackel). The latter is a long white metal tube, filled with flare composition, and provided with a wooden handle.

12. Equipment,—(a.) Personal.—The man's kit, consisting of—

1 pair "slacks," I pair drawers. 1 forage cap, 1 pair lace shoes, 2 shirts. 1 set boot brushes, 1 pair of socks. 1 grease tin, 2 handkerchiefs, 1 copper tin, 1 rice bag, 1 salt bag, 1 housewife,

is carried in a cowhide pack, supported by braces attached to the waistbelt. Inside the pack is a bag for preserved meat rations (iron rations), which can be carried separately if the packs are left behind. An aluminium (blackened) canteen, containing a cup which can be used as a frying pan with detachable handle, is carried on the back of the pack; the canteen holds 4½ pints. On the waistbelt, on each side of the buckle in front, is a leather pouch for 45 rounds, and 30 more are carried in the haversack, and the other 30 in pockets placed in the corners of the flap of the pack (150 rounds in all). The haversack (containing an aluminium drinking-cup) is carried looped on to the belt on the right side, and hooked on in rear of it is the water-bottle, of aluminium, felt-covered, with aluminium screwstopper and a capacity of 13 pints. On the left side are carried the sword-bayonet and the entrenching tool. The tools (spade, pick or hatchet), the metal portions of which are enclosed in leather cases, are hung (by means of a leather loop on the cases) from the belt, handle downwards, immediately behind the bayonet. Each man also carries a portion of a tent, consisting of a square of canvas, a pole in three pieces, three tent pegs and a cord; two men, therefore, carry the equipment (Zeltausrüstung) for one tent which can accommodate both. The whole equipment, put together, can be taken off and put on like a coat. The total weight, including arms, carried in field service marching order by an infantry soldier of medium height, is about 55 lbs. (See Plate 5.)

Field glasses are issued in the proportion of five per company.

Steel helmets are issued for trench warfare. The German steel helmet is made of hard, magnetic nickel-steel, and is rather heavier than our own, weighing complete about 2 lb. 8 oz. The helmet has a large lug projecting from either side to which a thick, bullet-proof, protective face-shield can be attached. This shield is very heavy, and is probably intended only for use by snipers and sentries. The Germans have a high opinion of the value of the steel helmet.

(b.) Gas helmet.—A special helmet is issued for the use of casualties suffering from wounds in the head. It is similar to the British P.H. helmet and made of stout rubber fabric. The helmet completely envelops the head and is tied round the neck with tapes. The goggles and drum are of the same pattern as those in the ordinary German leather gas mask. The goggles are provided with lint pads to relieve the pressure on the face, while a cylindrical metal piece prevents the air inlet from becoming stopped up by resting on the chin. The back of the helmet is lined with grey flannelette to avoid chafing of the fabric by the back of the head in a stretcher case.

The helmet is issued in a metal box, measuring $9\frac{1}{2}$ by $6\frac{1}{2}$ by $2\frac{1}{4}$. This box is marked by a red cross and the words "Gasschutzhaube für Kopfverletzte" (gas helmet for cases of

head wounds).

(c.) Steel helmet.—A new pattern steel helmet was introduced experimentally in July, 1918. It was painted with a dull composition which did not reflect the light. A semi-circular opening was made round the ears, and an adjustable chin-strap was fitted in place of the old pattern, which was thick and non-adjustable.

(d.) Gas mask.—The German respirator consists of two parts, a mask and a breathing

drum.

The mask is made of leather treated with oil and is provided with a fabric edging to make an airtight joint round the face. When in use, it is held in position by bands sewn to the edge of the mask and passing over the head. Spiral steel springs enclosed in fabric are

used, owing to the shortage of rubber, to provide elasticity in the head bands.

The eyepieces are made of celluloid and are held in metal rims pressed into the mask. In order to avoid dimming of the eyepieces, a thin disc of celluloid coated on one side with gelatine is used to cover the inside of the eyepiece. This disc is held in place by a screw ring so that it can be readily exchanged, spare discs being carried in the lid of the respirator box. The inside of the eyepiece is covered by a light metal grid to prevent the soft gelatine surface from being rubbed.

A metal plate (mouth-ring) into which the breathing drum is screwed, is attached to the bottom of the mask. A cord fastened to the top of this plate passes up between the eyepieces, outside the mask, through a loop in the forehead band, and is intended to be used to reduce the dead space inside the mask by pulling the mouth-ring closer to the face,

and also to take part of the weight of the drum.

A long loop of tape is attached to the edge of the mask. This loop is passed over the head so that the respirator hangs from the neck when carried in the "alert position."

The breathing drum (Einsatz) is a circular metal box with a screwed projection at one end for attaching to the mouth-ring of the mask, and a perforated metal plate at the other end through which the air enters the box. Owing to the fact that no valves are provided, the wearer breathes both in and out through the drum.

The latest pattern breathing drum contains two layers of granules, the lower layer consisting of charcoal and the upper of baked clay impregnated with hexamine and

potassium carbonate,

Extension.—In order to give increased protection against certain types of gas, an extension (Schnappdeckel) is provided. This consists of a perforated metal lid containing a

disc of porous paper; it is clipped over the outer end of the drum.

Method of carriage.—The complete respirator is carried in a cylindrical metal box, provided with a sling for carrying over the shoulder. In the "alert position" the sling is shortened and the box carried in front of the body. A spare drum is carried in a canvas cover attached to the belt, the drum being protected from wet by a metal cap over the screwed projection and a waterproof paper disc over the outer end.

Protection afforded.—The protection afforded by the German respirator, though good,

is greatly inferior to that given by the British "Box respirator."

(e.) Body shield.—The German body shield consists of a hard steel plate, curved slightly to fit the body, and covered in front with two layers of felt, followed by eight thicknesses of stout canvas, and behind with four thicknesses of stout canvas. A rectangular piece is cut away from the right hand top corner for purposes of observation or for the use of a rifle. The steel is a high quality steel of medium carbon content, containing an unusual number of special elements. The resistance of the shield to armourpiercing ammunition is good, and the total weight of the shield is 24 lbs. $4\frac{1}{2}$ ozs.

(f.) Telephone.—Prior to mobilization, it was laid down that each infantry regiment should provide 6 telephone squads (Fernsprech-Trupps), each consisting of 1 corporal or lance-corporal and 3 men. Each of these squads carried 3,300 yards of cable and 1 army telephone; two squads were necessary to construct a line, the maximum length of which was 6,600 yards. This allotment of stores provided for communication between the regiment and each of its 3 battalions.

It would appear from captured documents that the above allotment has been considerably increased; the present organization for open warfare varies, but appears to be

roughly as follows:-

Each battalion has a telephone detachment (Fernsprech-Abteilung), consisting of an officer and 4 company squads (Trupps) each of 1 non-commissioned officer and 3 men. The detachment is provided with 4 army telephones and sufficient cable to erect 13,000 yards of line.

The 3 battalion detachments of an infantry regiment are responsible for all telephone communications from the infantry brigade downwards. Under the new organization, neither brigade nor regimental staffs appear to be provided with telephone equipment.

(g.) Tools.—The tools carried by an infantry regiment are as shown in the following table:

How carried.	For earth works.				For timber work, &c.				
	Spades and shovels.		Picks.	Pickaxes.	Hatchets.	Axes.	Saws.		Wire- cutters.*
	Small.	Large.			Hate		Hand.	Cross-cut.	GUUUDIS.
By the ment 1st line transport Train	1,200	30 230	15 65	120	60 15 30	24 30	•••	12 2	916
Total	1,200	260	80	120	105	54	6	14	

[†] In every company half the men carry entrenching tools * Numbers not known. (viz., 100 small spades, 10 pickaxes and 5 hatchets).

13. Designation of infantry regiments.—Although all infantry regiments are similarly armed and equipped, a number of them bear special designations which serve to foster esprit de corps. Guard regiments are designated as follows:—

Foot Guards Regiment (Garde-Regiment zu Fuss). Guard Fusilier Regiment (Garde-Füsilier-Regiment). Guard Grenadier Regiment (Garde-Grenadier-Regiment).

Line regiments also in some cases have special designations, such as :-

Grenadier Regiment (Grenadier-Regiment).
Body Grenadier Regiment (Leib-Grenadier-Regiment).
Body Regiment (Infanterie-Leib-Regiment).
Fusilier Regiment (Füsilier-Regiment).

Grenadier regiments wear the Litzen* on collar and cuffs, which also distinguish al Guard regiments. In most cases, the 3rd battalion of a grenadier regiment is known as a fusilier battalion.

All Active infantry regiments of the line have, besides their number, a territorial title, e.g., 120th Inf. Regt. (2nd Württemberg). The Active regiments of old standing have often an honorary title in addition, thus the 120th Inf. Regt. (2nd Württ.) also bears the title Kaiser Wilhelm, König von Preussen.

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CHAPTER VI.

MACHINE GUNS AND AUTOMATIC RIFLES.

- 1. Peace organization.—Machine guns form a factor of ever-increasing importance in the organization of the German Army. In peace, every infantry regiment and Jäger battalion was provided with a machine gun company of 6 guns and 1 spare gun. In addition, there were a number of independent field and fortress machine gun detachments (Abteilungen), which were rapidly absorbed in the early stages of the war to provide machine gun units for new formations.
- 2. Expansion during 1915 and 1916.—As the demand for more machine guns grew, and as the output increased, a number of new machine gun sections were formed. These sections, known as Feldmaschinengewehrzüge and Maschinengewehr-Ergänzungszüge (supplementary machine gun sections), consisted of 30-40 men under an officer, with three or four machine guns. One or two of these sections were attached to infantry regiments as required, and, in some cases, were absorbed to form a second machine gun company for the regiment to which they were attached. By the end of 1915 several infantry regiments possessed two machine gun companies.

During the winter of 1915-1916, a new series of special machine gun units was

formed and trained with the purpose of developing to the full the power of the arm.

These units were known as machine gun marksman sections (M.G. Scharfschützen-Trupps). They were formed from picked machine gunners who underwent a course of four or five weeks' instruction at the training centres at Döberitz (Brandenburg), Hammelburg Their training was specially directed towards the (Bavaria) and Beverloo (Belgium). employment of machine guns in the attack.

In February and March, these units began to arrive at the front and were first employed in the battle of Verdun during March, 1916. They were allotted to infantry regiments engaged in offensive operations or holding difficult sectors. The total number

of marksman sections formed was 200, i.e., approximately one per division.

The establishment of a machine gun marksman section was as follows:-

1 captain or lieutenant,

2 Feldwebel or Vizefeldwebel,

6 gun commanders (Unteroffiziere),

20 lance-corporals,

40 machine gunners,

1 cyclist orderly,

1 armourer,

1 medical corporal,

1 transport driver,

6 spare men,

making a total of 1 officer and 78 other ranks.

At the beginning of 1916 the number of machine guns in the German Army had increased from 1,600, the peace strength, to something over 8,000. The output was steadily increasing and the experiences of the campaign had established the extreme importance of the machine gun both in attack and defence. A separate inspectorate was formed for the machine gun service,

3. Reorganization in 1916.—By July, 1916, the total number of machine guns, including captured guns, in use, had risen to 11,000. No standard organization had, however, been adopted, so that the successive creation of variously organized machine gun units led to a very irregular allotment of machine guns to infantry formations. Thus, in the spring of 1916, some infantry regiments had only 6 machine guns, while others had more than 25. In August, 1916, the machine gun formations were reorganized, and the machine gun company of 6 guns was adopted as the standard unit. A staff officer for machine guns was added to the Headquarters of each Army. By the end of 1916, the number of machine guns in the German Army had risen to nearly 16,000.

The organization introduced in September, 1916, is as follows:—

A.—Regimental machine gun companies.—Every infantry regiment has three machine gun companies, numbered 1st, 2nd and 3rd. One of these companies is attached to each battalion of the regiment. At the headquarters of each infantry regiment there is a regimental machine gun officer who acts as technical adviser and supervises the supply of material and ammunition.

The second and third machine gun companies in each regiment were formed by absorbing the existing "sections," "supplementary sections" and "detachments" attached

to infantry units. The reorganization had been completed by the end of 1916.

B.—Machine gun marksman companies.—The machine gun marksman sections already existing prior to August, 1916, were converted into companies, with an establishment identical to that of the regimental machine gun companies. These machine gun marksman companies are not attached to infantry regiments, but are combined in groups of three to form "machine gun marksman detachments" (Maschinen-Gewehr-Scharfschützen-Abteilungen), which act as a reserve of machine guns at the disposal of G.H.Q. One of these machine gun marksman detachments is normally attached to each division engaged in active operations. About 90 have been identified:

These units are more highly trained than the regimental machine gun companies;

all ranks wear a metal badge, representing a machine gun, on the left arm.

The Machine Gun Marksman Headquarters Staff West, which was formerly at Rozoy

(south of Hirson), has been transferred to Tongres (north of Liége).

To summarize:—The basis of the machine gun organization in the German Army is the machine gun company. These units are employed either:—

(a.) Singly, attached to infantry battalions, or

- (b.) Combined in groups of three "marksman companies" in "marksman detachments," which are attached as a reserve to divisions on active fronts.
- 4. Development in 1917.—During 1917, the number of machine guns in the German Army was very largely increased. Although the number of machine gun units allotted to a division was not raised, the formation of new divisions involved the creation of a number

of new machine gun companies. But the greatest change consisted in the increase of the number of guns in a machine gun company, which was successively raised from 6 to 8,

then to 10, and finally to 12.

At the same time, the various types of light machine guns (see page 71), which had been introduced by way of experiment in 1916 as an answer to the Lewis gun, were superseded by the issue of the light ('08/'15 pattern) machine gun to all infantry battalions. By the end of 1917 every infantry company on the Western Front had received 3 light machine guns, and some companies had already been equipped with 6 light machine guns—the maximum contemplated. The detachments for these machine guns were found by the units themselves, so that no additional personnel had to be provided.

At the beginning of 1918 each division on an active front had the following allotment

of machine guns:-

Light machine guns.—3 per infantry company; total, 108.*

'08 pattern machine guns. - 12 per battalion machine gun company; total, 108. man detachment attached-36.

A total of 108 light and 144 heavy machine guns.

5. The Campaign of 1918.—The allotment of 6 light machine guns to each

infantry company was completed in 1918.

A captured order of the 6th April, 1918, stated that in offensive warfare each infantry company should reckon on having 4 light machine guns and one spare gun, and that each battalion machine gun company should reckon on having six '08 machine guns and 3 spare guns. This was no doubt (as regards the '08 machine guns) a temporary reduction intended to secure greater mobility.

Another order of the 23rd July, 1918, showed the regular establishment still to be 12 '08 machine guns to each battalion machine gun company and 6 light machine guns to each infantry company—a total of 108 heavy machine guns and 216 light machine guns per

division.

The following table gives an approximate idea of the increase in the number of machine guns in the German Army during the war :-

August, 1914	e.		1.00	100	1,600
December, 1915	March Land		A4614 . 11		8,000
July, 1916	med e	7.54	7 Julia		11,000
January, 1917				### ?. Yio	16,000
January, 1918					32,000 + 37,000 light machine guns.
November, 1918	••				40,000† + 50,000 light machine guns.

The full establishment was 6 per infantry company (see page 52).

[†] The personnel of a machine gun company was formerly armed with the '98 pattern rifle, but a memorandum of the Prussian War Ministry, dated the 30th June, 1918, shows that it was proposed to replace the '98 rifle by the '98 pattern carbine,

6. The establishment of a machine gun company (or a machine gun marksman company) is as follows:—

Personnel.		entra production of the section of t	Ho	rses.	Vehicles.
Officers.	N.C.Os. and men.	The state of the s	Riding.	Draught.	(2-horsed)
1		Company commander	1		HOT HEY
3	EMEGRA PER SON OF	2nd Lieutenants or Offizierstellvertreter		Devision as	371 - E 25-51,50 S
	1	Serjtmajor (Feldwebel)			
1.1	5	17:		aropiloova	ion sil
	12	Gun commanders (Unteroffiziere)	••		••
	1	· 이 교통이 보고 있다. 이 경우 교육 경우는 이 분석이 되는 이 분석이 되는 이 분석이 불어보고 있다. 이 분석이 되는 이 경우를 하는 것이 되는 것이 없는 것이 없는 것이 없는 것이다. 그 생각이 없는 것이 없는 것이다. 그 없는 것이 없는 것이 없는 것이다. 그 없는 것이 없는 것이 없는 것이다. 그 것이다	••	• •	THE STATE OF THE
	, i	Armourer-serjeant	147 • • 1174	ta apasa . A	/48 -
••		Quarter-master-serjeant	ganti dibe	••	
di ka malan k	1	Corporal-cook	un d <mark>i</mark> no i	OBASA BARA	ion sittle
••	2	Armourer's assistants	••		water in the last
	1	Medical corporal	••	••	••
617.	16	Lance-corporals \ *			ned tell
	89	Privates)	404,004,00		Participation of the Committee of the Co
••	4	Train soldiers attached	• 4	• •	• •
		2-horsed machine gun wagons		12	6
evet -	105-151-153E0	2-horsed machine gun ammunition wagon.		2	1 ,
orani.		2-horsed machine gun supply wagon	ngg••ngk	2010	(epril 1 1)
		for rations and forage. Small 2-horsed travelling kitchen	or old far en. Normalitier	2	Í
4	133	Total		18	10 10 9 1

There are also 6 hand-carts (M.G. 08), each drawn by 2 men.

7. Special machine gun units.—(a.) Mountain machine gun detachments.—In addition to the regimental machine gun companies and machine gun marksman companies described above, there exist 55 mountain machine gun detachments (Gebirgs-Maschinen-Gewehr-Abteilungen), which are specially equipped for mountain warfare. They were at one time employed in the Vesges, but in 1916 were all transferred to the Carpathians and the Balkans. The personnel wear the uniform of the mountain troops.

(b.) Motor cyclist machine gun detachments.—These were being formed late in 1918 for use as flying infantry. The gun is carried on the back. The detachment of 50 men comprises also a motor cycle with side car carrying an anti-aircraft machine gun,

and a fast motor lorry carrying 7 mechanics, ammunition and spare parts.

(c.) Machine gun companies of cyclist battalions.—These units were formed in July, 1916, for use with the cyclist battalions which later took part in the Roumanian campaign. The machine guns are mounted on motor lorries.

Each company has six machine guns; its establishment is as follows:-

3 officers,

1 serjeant-major (Feldwebel),

1 Vizefeldwebel,

6 gun commanders (Unteroffiziere),

(6754)

^{*} Made up as follows:—84 machine gunners, 1 cyclist, 1 shoemaker, 3 orderlies, 1 shoeing-smith, 6 drivers, 6 telephonists, 1 tailor, 2 cooks.

1 armourer-serjeant,

1 medical corporal, 34 lance-corporals and privates,

2 corporals of the mechanical transport troops,

12 mechanical transport drivers,

1 motor-cyclist,

3 train soldiers attached.

The company is organized in 3 sections, each of 2 guns. Each section is transported in a motor lorry, with guns, detachment and ammunition, so that each lorry can act as an independent unit. The ammunition carried consists of 15,000 rounds per gun.

The transport consists of—

2 3-ton lorries for gun detachments,

1 3-ton lorry for baggage, tools and reserve ammunition, 1 4-horsed machine gun supply wagon ('08/'15 pattern).

The men are armed with revolvers and the non-commissioned officers are provided with field-glasses in addition.

(d.) Cavalry machine gun units.—In peace, no machine gun units were attached to cavalry formations. There existed, however, 11 independent machine gun batteries (Abteilungen), which, on mobilization, were allotted to the 11 cavalry divisions.

A Jäger battalion (with its machine gun company) was also attached to each cavalry

division, which thus disposed of 12 to 14 machine guns.

During 1916, a machine gun section was attached to each cavalry regiment, and these sections were finally expanded into machine gun squadrons, each comprising 8 machine gnus.

No details are available concerning the organization, armament or means of transport of machine gun squadrons.

(e.) Anti-aircraft machine gun units (see page 174).

(f.) Allotment of machine guns to artillery.—(i.) Employment.—The allotment of machine guns to artillery was apparently begun during 1917, on a scale of two machine guns per battery. According to prisoners' statements, the personnel is provided by the battery.

The machine guns are provided with the auxiliary mounting (Hilfslafette). This is a very light mounting which, for anti-aircraft purposes, is attached by screws to the top of a post (Fliegerpfahl) or to a limber. For close defence in trench warfare it is similarly

attached to a short length of plank.

(ii.) Equipment.—A captured document, dated 20th November, 1917, gives the following information regarding the equipment of the machine gun detachment of a field or foot artillery battery:—

Machine guns.—Two '08 pattern machine guns, mounted on auxiliary mountings, with

the following spare parts and accessories:-

1 spare auxiliary mounting.

2 spare locks.

4 spare barrels.

2 ball-firing attachments with flash obscurer.

2 anti-aircraft sights.

2 luminous sights.

2 telescopes.

4 pairs of smoked glasses.

In addition, the usual tools and accessories,

Ammunition.—The following ammunition in belts is carried on the handcarts in 18 ammunition boxes:—

3,300 rounds (if possible, armour-piercing).

In addition, 3,400 rounds in belts are kept in the battery position, being left behind when the battery moves, making a total of 3,350 rounds per gun.

Transport.—The transport consists of 5 handcarts employed as follows:—

As the machine gun equipment cannot be carried on the battery vehicles without overloading them, it is laid down that this equipment must be loaded on the handcarts, which are to be drawn by men belonging to the battery; two men are required for each handcart.

8. The '08 heavy machine gun.—All the above-mentioned units are armed with the 1908 pattern (Maxim) machine gun, known as M.G. 08 (see Plate 15). The '08 gun has the same calibre as the German rifle, namely, '311 inch (7.9 mm.). The gun is mounted on a sledge with four legs. The height of the gun in action can be adjusted by altering the spread of the legs. During 1918, an anti-aircraft attachment was introduced which allowed of high angle fire, and an "all-round" traverse.

Details of '08 machine gun.

Muzzle velocity	2821 f.s.
Limit of sighting	2,200 yards.
Extreme range (at 32° elevation)	4,400 yards.
	400-500 rounds per minute.
	250.
	16 lbs.
Length of gun without muzzle attachment	43 inches (over all).
Length of barrel	28.35 inches.
Weight of gun	55 lbs.
Weight of sledge mounting	75 lbs.
Weight of gun complete with sledge (Schlitten) and	and there substitutes by
대한 사람들은 얼마를 살아내는 살아내는 그들은 그가 있는데 그 사람들이 가장 그는 것이 없는데 그는데 그는데 그는데 그는데 그는데 그는데 그는데 그는데 그는데 그	140 lbs.
	$8\frac{1}{2}$ lbs. (7 pints).
Height of axis above ground	11 inches. The first of the second se

Machine guns were originally manufactured only at the Government factories at Berlin and Spandau, but factories now exist also at Nürnberg, Erfurt, Sömmerda and Suhl. The three last appear to produce principally light machine guns. Each gun is stamped with the year of manufacture and the factory number.

There are factories for repairing captured machine guns at Brussels-Etterbeek and

Warsaw.

A prismatic Goerz sight with a magnification of $2\frac{1}{2}$ diameters is provided, which slides into a slot on the gun. During 1918, a special dial sight was introduced for long-range indirect fire. One pair of field glasses is allowed for each '08 pattern machine gun.

Anti-aircraft sights.—A circular foresight (Kreiskorn) and special V-shaped backsight are employed with both the '08 and the '08/15 pattern machine gun for anti-aircraft purposes.

The circular foresight, which is attached to the barrel casing, consists of two wires crossed at right angles in the centre of two concentric circles. According to the angle at which the aeroplane is either approaching or flying away, the requisite amount of "lead" is obtained by taking aim over the appropriate portion of the inner or outer circle. The backsight is clamped to the leaf of the ordinary backsight.

9. Machine gun ammunition.—The amount of ammunition carried per gun prior to the reorganization of the machine gun units was—

8,000 rounds per gun on the limbered gun wagons. 4,000 rounds per gun on the 3 ammunition wagons.

Total .. 12,000 rounds

The amount now carried appears to be-

8,000 rounds per gun on the limbered gun wagons. 1,300 rounds per gun on the ammunition wagons.

Total .. 9,300 rounds.

The ammunition used by machine gun units is of five kinds (for description, see page 57), namely—

(a.) Ordinary (S or Rillenmunition).

(b.) Heavy (s.S. Munition).(c.) Armour-piercing (S.m. K.).

(d.) Armour-piercing tracer (L.S. Munition).

(e.) Incendiary tracer (Brandmunition).

Armour-piercing and tracer ammunition are employed against aircraft, the former being also used against tanks, loophole plates, &c.

The usual proportion of tracer to ordinary ammunition in a machine gun belt is one

tracer in every 10 rounds.

Explosive bullet ammunition was formerly used against aircraft, but its use has been discontinued.

10. Training of machine gunners.—Great care is devoted to the training of machine gunners, more particularly of the personnel of "marksman" units, but all machine gunners are picked men.

The principal machine gun schools in Germany are at Döberitz (for Prussian troops), Hammelburg (for Bavaria), and Zeithain (for Saxony). There are also large schools at

Beverloo and Brasschaet in Belgium.

The principal training school for machine gun marksmen (M.G. Scharfschützen Ausbildungs-Kommando West) was at Rozoy-sur-Serre (south of Hirson), but was transferred to Tongres (north of Liége) at the beginning of 1918. Courses of instruction for machine gun officers are held at Waulsort in Belgium.

A machine gun course usually lasts a month, and the following are the main features

of the instruction given :-

(a.) Expert knowledge of the German machine gun, which every man must be able to dismantle and assemble again.

(b.) Carrying out repairs, and dealing quickly with all kinds of "jams."

(c.) Handling of captured guns (especially the Lewis gun).

(d.) Range practice at fixed targets—beginning at 400 and ending at 800 metres.

(e.) Firing at moving dummies at various ranges up to 800 metres.

(f.) Sustained fire at the rate of 500 rounds per minute, including addition of fresh water to the jacket at the end of the fourth belt (i.e., after 1,000 rounds).

(g.) Signalling and entrenching.

(h.) Lessons in the construction of alternative emplacements in the trenches.

11. "Musketen" battalions.— Musketen battalions first appeared in the Champagne battle in September, 1915, when three were identified.* Two of these units took part in

the Somme battle, but they did not prove a success.

A Musketen battalion originally consisted of about 500 men, and was organized in three companies. Each company was armed with 30 automatic rifles, and had an establishment of 4 officers and 160 other ranks. There was a squad of 4 men for each automatic rifle.

According to official orders captured during the Somme battle, the automatic rifle was regarded purely as a defensive weapon and was not employed in the attack. Units armed with automatic rifles were to be kept as a reserve of fire-power, usually in second line positions, to defend threatened points.

The Muskete is similar in construction to the Danish Madsen automatic rifle. It has

two pivoted supporting legs attached near the muzzle.

The rifle is fed from a magazine holding 25 rounds. The barrel, range and ammunition are the same as for the '08 pattern machine gun.

In April, 1918, the 1st and 2nd Musketen Battalions were re-armed with heavy

machine guns, '08 pattern, the Muskete having proved an unsatisfactory weapon.

A War Ministry order, dated the 22nd April, 1918, shows that the 1st and 2nd Musketen Battalions were then converted into two machine-gun marksman detachments and placed under the orders of M. G. Ss. Kdo. West (see paragraph 10 above). They retained their former name and uniform, but were allowed to wear the badge of the machine gun marksman detachments. The 1st Ersatz Musketen Company, which was formed on the 6th November, 1915, to act as the depôt for the Musketen battalions, was disbanded, and the Machine Gun Depôt Company which supplies the machine gun companies of the 117th Infantry Regiments, now acts as depôt for the Musketen battalions.

12. The '08/'15 light machine gun.—(See Plate 16.) The issue of the '08/'15 light machine gun began in March, 1917, on the scale of 3 to every infantry company. This allotment was eventually raised to 6 per infantry company, thus giving 2 guns to each platoon. The detachments for the light machine guns are found by the units themselves, a

^{*} The 1st Musketen Battalion was originally the 4th Battalion of the 117th Body Infantry Regiment.

light machine gun group consisting of 1 *Unteroffizier* or lance-corporal and 8 men with one light machine gun. In each company the light machine guns are supervised by a senior N.C.O. and an armourer-assistant. Each battalion has been provided with a field wagon

(1895 pattern) for transporting the light machine guns.

An order issued by German General Headquarters on the 30th May, 1918, showed that it was then intended that pioneer and *Minenwerfer* companies on the Western Front should each be provided with two light machine guns, with handcart. Each pioneer and *Minenwerfer* company was to train an officer and at least two teams, each consisting of one gun commander and four gunners.

The '08/'15 light machine gun (l.M.G. 08/15), though water-cooled, can be carried and operated by one man. It has been evolved from the '08 pattern machine gun by

making the following changes:-

(a.) The diameter of the barrel casing has been reduced from 5·3 inches to 3·5 inches, and its capacity from 7 to 5 pints.

(b.) The thickness of the breech casing has been reduced from 16 inch to 12 inch.
(c.) The ejector tube has been discarded. The empty cases are ejected through an aperture in the front of the breech casing.

(d.) The rear cross-piece has been replaced by a rifle butt and pistol grip.(e.) The sledge mounting has been discarded for a bipod with adjustable pivot.

(f.) The gun is fitted with a rifle sling.

The ballistics are similar to those of the '08 pattern machine gun, but the light machine gun is not so accurate. Belts containing either 100 or 250 rounds are used.

The gun is fitted with a muzzle attachment and flash obscurer.

13. The '08/18 light machine gun.—(See Plate 16.) This gun (l.M.G.~08/18) is the original '08/15 pattern converted from water-cooled to air-cooled. The consequent reduction in weight is about $8\frac{1}{2}$ lbs.

Both guns are operated in the same manner and fire the same ammunition.

The water jacket of the '08/'15 gun has been replaced by a barrel casing, $1\frac{1}{2}$ inches outside diameter, perforated with numerous holes to allow of the free circulation of air round the barrel. At the rear end of the barrel casing the diameter has been increased slightly to take a clamp with a circular bearing, to which the bipod is attached, allowing for an all-round traverse. This clamp is always left on the gun.

 $1\frac{1}{2}$ inches in front of the bipod clamp is a hand-grip with wooden handle attached,

which enables the gunner to lift the gun without burning himself.

 $4\frac{3}{4}$ inches in front of the hand-grip is a ring for attaching the fore-end of the sling. The foresight standard is $2\frac{1}{2}$ inches high; this is necessitated by the decreased diameter of the barrel casing. On the front face of the standard are two studs and a threaded hole, probably used for attaching the anti-aircraft foresight.

At preliminary tests, 500 rounds were fired as quickly as possible. The gun had only a few stoppages, owing to trouble with the belt. At the end of the test the gun

appeared to be in a serviceable condition.

Comparative Weights of '08f' 15 and '08; '18 Machine Guns.

	'08/'15 gun.	'08/'18 gun.
Gun and bipod	$40\frac{1}{2}$ lbs. (water jacket filled)	32 lbs.
Filled belt, drum and holder	11,,	11 ,,
Total weight in action	10^{11} , 10^{11}	43 "

14. Anti-tank machine gun.—From an order issued by German General Headquarters on the 29th September, 1918, it appears that an anti-tank machine gun on the lines of the 13 mm. anti-tank rifle (see page 56) was then being manufactured, but no specimens of this weapon have been met with.

The German designation is Tank- und Flieger - Maschinengewehr (abbreviated to

Tufmaschinengewehr) or anti-tank and anti-aircraft machine gun.

15. Double-barrelled machine gun.—It was reported that the Germans were manufacturing a double-barrelled machine gun, called the Stottbus Maschinengewehr, in the summer of 1918. The details of this weapon, which does not appear to have got beyond the experimental stage, are stated to be as follows: -

The gun, which is water-cooled, has 2 barrels enclosed in a jacket. Each barrel has a separate breech mechanism, which is a modification of that of the '08/'15 light machine gun; there is only one trigger; each barrel can be fired independently of the other if required. The gun is supported by a bipod. The length of the barrels is 23.6 inches (60 cm.). The sights are the same as those of the '08/'15 machine gun.

16. Automatic carbine.—German aeroplanes are sometimes equipped with an automatic carbine, called Flieger-Selbstlader-Karabiner 15 für 7mm. Munition, which closely resembles the Mexican Mondragon automatic carbine, but is apparently manufactured in

The chief characteristics of this weapon are:-

(a.) It is actuated by gas pressure and not by recoil.
(b.) It is provided with a magazine, containing 10 cartridges; an auxiliary magazine (Ansteckmagazin), in the form of a drum can also be employed. This latter magazine holds 30 cartridges which can only be fired as single rounds. This weapon is far too delicate for use in war, and has never been issued in any numbers.

CHAPTER VII. CAVALRY.

1. General organization.—The German cavalry is organized in—

(a.) Independent cavalry divisions.

(b.) Divisional cavalry.

In peace, the cavalry was not organized in divisions, except in the case of the Guard cavalry, but each Army Corps District provided two or three cavalry brigades. On mobilization, 11 cavalry divisions were f rmed, the regiments surplus to the requirements of the cavalry divisions furnishing the divisional cavalry of infantry divisions. A few cavalry brigades are employed independently.

In peace, the German cavalry consisted of 110 cavalry regiments, each of five squadrons. On mobilization, each regiment left one squadron behind at its home station to

act as a depôt squadron.

Most cavalry regiments now have a fifth squadron in the field, and some a sixth, but these extra squadrons are detached as divisional cavalry. A regiment forming part of a cavalry division consists of four squadrons and a machine gun squadron.

The war establishment of a squadron is:-

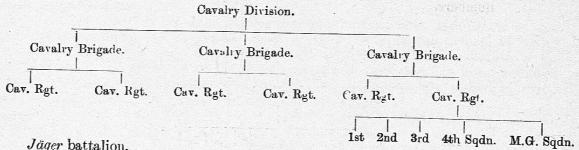
4 officers. 163 other ranks (150 sabres). 178 horses.

3 vehicles.

According to a recent War Ministry order a maximum strength of 102 men on the Western Front and 106 men on the Eastern Front is fixed for cavalry squadrons attached to infantry divisions.

2. Organization of a cavalry division. -11 cavalry divisions were formed on mobilization, and this number was never increased, except for temporary formations now dissolved.

The normal composition of a cavalry division is as follows:-



Jäger battalion.

1 or 2 cyclist companies. Machine gun Abteilung.

Horse artillery Abteiling (3 batteries).

('avalry pioneer detachment (1 officer and 33 other ranks).

Signal detachment (Nachrichten-Abteilung), comprising 1 heavy or 2 light wireless stations, and the telephone squads of the regiments.

The war establishment of a cavalry division is—

283 officers. 4,955 other ranks. 5,590 horses. 216 vehicles.

3 Employment of cavalry divisions.—Before the war, the German cavalry was taught to rely more on the fire action of artillery, machine guns and carbines than on the arme blanche. Mass and shock tactics were discouraged, special stress being laid

on vigorous offensive action by small cavalry detachments.

The German cavalry divisions displayed little enterprise or initiative at the beginning of the campaign. Their tactics during the initial advance were marked by extreme caution, and seemed directed towards passive reconnaissance rather than to offensive action. During the retreat from the Marne to the Aisne, and again in October, 1914, the German cavalry rendered valuable assistance to its infantry. Reinforced by Jäger battalions and machine gun batteries, and sometimes even by heavy artillery, the cavalry divisions effectively extended the northern flank of the battle-line, and fought stubborn rearguard actions until relieved by the arrival of the infantry divisions.

From the autumn of 1914 to December, 1916, the cavalry divisions, with one exception, were employed on the Eastern Front, where the operations partook more of the nature of open warfare than in the West. One cavalry division was, however, retained in

Belgium for the purpose of policing the country and guarding the Dutch frontier.

When the German retirement to the "Hindenburg Line" took place in March, 1917, an opportunity was created for open warfare, when cavalry could again perform its normal rôle. Three cavalry brigades, drawn from the 2nd and 7th Cavalry Divisions, were sent from Belgium to the Somme area to assist in covering the retirement. The withdrawal of the First Army, between Arras and Péronne, was covered by infantry rearguards and squadrons of divisional cavalry. The retirement of the Second Army, between Péronne and the Oise, which was a more extensive manœuvre, was covered by three cavalry brigades and five cyclist battalions. The cyclists were used to hold bridge-heads, villages and strong points, with the object of delaying the pursuit and covering the pioneer detachments which effected the demolitions. The mission of the cavalry was chiefly reconnaissance; patrols were left behind the rearguards to watch and report on the progress of the pursuit; these patrols fell back slowly avoiding engagements, but keeping touch with the British and French advanced troops.

Towards the end of 1917, it was apparently decided to use cavalry in the Western Theatre as dismounted troops, in order to increase the number of rifles available for holding the line. For this purpose cavalry divisions in the Western Theatre were reorganized into three brigades, each of three regiments. At the end of 1918, there were four such

dismounted cavalry divisions operating on the Western Front.

4. Divisional cavalry.—Originally, each infantry division had two or three squadrons of divisional cavalry, and in some cases a whole cavalry regiment. Only one

squadron is now allotted to each infantry division.* During trench warfare, the squadrons of divisional cavalry assist the infantry by taking turns in the trenches. When not thus employed, these units do duty in patrolling the roads, as escorts, and in finding guards, posts, piquets and orderlies.

The divisional cavalry is often used in manning observation posts in trench warfare.

^{*} For strength of divisional cavalry squadrons, see page 74.

5. Cavalry units formed during the war.—Since the beginning of the war, 39 Reserve cavalry regiments have been formed, in addition to a certain number of Ersatz regiments, Landwehr and Landsturm squadrons and Reserve Cavalry Abteilungen.

These units are principally allotted as divisional cavalry to new formations; some of them, more especially the Landsturm squadrons, are employed in guarding neutral frontiers

and in patrolling the occupied territories and the lines of communication.

During 1917 a great many of these units were broken up.

6. Dismounted cavalry units.—During 1916, a number of regiments employed as divisional cavalry were withdrawn from the front, dismounted, and converted into dismounted rifle regiments (Schützen-Regimenter). The units thus dismounted were chiefly Reserve and Ersatz formations.

Towards the end of 1917 and during 1918, cavalry divisions operating in the Western Theatre were reconstituted and employed as dismounted cavalry divisions of nine regiments

each (see page 75).

Dismounted rifle regiments are equivalent to infantry battalions and are organized as follows:—

4 squadrons.

1 machine gun company.

Each squadron consists of three platoons and a trench mortar detachment, so that it resembles an infantry company. The men are armed with carbines and bayonets and are equipped as infantrymen.

In some cases the squadrons are called companies.

7. Armament.—The armament of the cavalry is the same for all mounted regiments. At the beginning of the war, officers and staff-serjeants were armed with sword and revolver; corporals with lance, sword and revolver; lance-corporals and privates with lance, sword and carbine. At the end of 1914, bayonets were issued to the cavalry,* and in July, 1915, their swords were withdrawn.

(a.) Lance.—The steel lance (Stahlrohrlanze) has a four-edged point of forged steel

forming one piece with the shaft, which is of cast steel and hollow.

Length 10 feet 6 inches. Weight 3.94 lbs.

(b.) Automatic pistol.—The revolver formerly in use has been replaced by the '08 automatic pistol, which takes eight cartridges.

 Calibre
 ...
 ...
 ...
 ...
 ...
 ...
 ...
 ...
 ...
 1.8 lbs. (835 grammes).

 Weight of bullet
 ...
 ...
 ...
 ...
 125 grains (8 grammes).

(c.) Carbine.—The '98 pattern carbine (Karabiner 98) is similar in design to the '98 pattern rifle and takes the same ammunition.

Calibre311 inch (7.9 mm.).

Weight 7.93 lbs

Length $43\frac{1}{4}$ inches $(5\frac{1}{2}$ inches shorter than rifle).

Length of barrel . . . $23\frac{1}{2}$ inches. Sighted up to 2,200 yards.

^{*} The more recently formed Jäger zu Pferde regiments had already been equipped with the bayonet prior to mobilization.

8. Saddlery and personal equipment —The saddle is somewhat similar to that in use in the British Service, but is lighter and higher in the arch and the flaps are deeper and wider. The girth-buckle protector flaps are of numnah, and the panels are made of the same material. A thick woollen blanket (7 feet 7 inches by 6 feet 4 inches) is folded in four under the saddle. The stirrups are wide and heavy, and are made of nickelled metal. The girths are of the Cape pattern and a surcingle is carried. The wallets in which the kit is carried are large and roomy, more of the nature of saddlebags. In the near wallet is a pocket for cartridges, and the shoe case is attached to the outside of it. A spade or hatchet can also be attached.

The bits differ from those in use in the British Army; the bridoon is much thicker,

and the big bit has a considerably lower port and shorter cheek.

A short piece of rope, with a ring at one end, is carried over the carbine bucket. When a number of these ropes are joined together one long picketing rope is made, which passes over two long stakes carried in one of the baggage wagons and forms the picket line to which the head ropes are attached.

A corn sack, shaped like a sausage, is strapped in rear of the saddle over the rolled

The carbine is usually carried in a bucket, fitted with a flap to button over the butt, on the near side of the saddle in an almost vertical position, except in the Bavarian cavalry, where it is carried in a case fixed to the off wallet and rests on the man's thigh. On patrol work and when a fight is imminent, however, the carbine is carried slung over the shoulder.

A mess-tin made of aluminium, holding 41 pints, is carried in a leather case on the near side of the saddle. The tin cover can be used as a cup or frying pan, and a separate handle for this cover fits inside the mess-tin. The water-bottle is the same as that of the infantry, and is carried in the same manner.

When fully equipped in marching order the weight carried by the troop horse without

the man is about 100 lbs.

An officer's saddlery and equipment consists of an officer's regulation saddle, blanket (Woilach), two wallets, one saddlebag, shoe case, greatcoat cover, corn sack, drinking bucket and leather head rope.

9. Equipment.—Cavalry regiments acting with cavalry divisions are provided with telephone and bridging equipment, together with tools and explosives for effecting demolitions.

(a.) The telephone equipment consists of two army telephones and 15,300 yards of "cavalry wire," the whole being carried on horseback. Each regiment has two telephone

squads, each of two non-commissioned officers and two men.

(b.) The bridging equipment of a cavalry regiment consists of four half-boats of galvanized steel, together with the necessary transoms, chesses and other stores. The half-boats are 11 feet $3\frac{1}{2}$ inches long, 5 feet 2 inches broad, and weigh about $2\frac{1}{2}$ cwt. They are lashed together stern to stern, thus forming a complete boat, which can carry 8-10 men with their equipment. The bridging material is carried in two 6-horsed cavalry bridge wagons.

The material carried by a cavalry regiment is sufficient to construct about 21 yards of footbridge (Brückensteg), or 13 yards of light bridge (Laufbrücke), or about 81 yards of bridge to take field guns (verstärkte Laufbrücke). This material can also be formed into a raft capable of transporting 30 infantrymen with their equipment, or four horses and horse-

holders, or one field gun and limber.

(c.) The explosives carried by a cavalry regiment consist of 40 explosive cartridges and fuzes.

- 10. Designation of cavalry regiments.—The Active cavalry regiments, although all similarly armed and equipped, are differently designated, as follows:—
 - 1 Regiment of Gardes du Corps. 1 Guard Cuirassier Regiment.

8 Cuirassier Regiments.

(No. 1 is known as the "Body Cuirassier Regiment.")

2 Guard Dragoon Regiments.

26 Dragoon Regiments.

(No. 3 is known as the "Horse Grenadier Regiment.")

(No. 20 is known as "Body Dragoon Regiment," and Nos. 23 and 24 as "Guard Dragoon Regiments.")

(Nos. 25 and 26 are Württemberg.)

1 Body Guard Hussar Regiment.

20 Hussar Regiments.

(Nos. 1 and 2 are known as "Body Hussar Regiments")

Nos. 18, 19 and 20 are Saxon.)

3 Guard Ulanen Regiments.

21 Ulanen Regiments.

(Nos. 17, 18 and 21 are Saxon.) (Nos. 19 and 20 are Württemberg.)

1 Saxon Guard Cavalry Regiment (Garde-Reiter-Regiment).

1 Saxon Karabinier Regiment. 13 Jäger zu Pferde Regiments.

2 Bavarian *Ulanen* Regiments.

2 Bavarian Heavy Cavalry Regiments (Schwere-Reiter-Regimenter).

8 Bavarian Light Horse Regiments (Chevaulegers-Regimenter).

There are 39 Reserve cavalry regiments, formed during the war, each of 4 squadrons. They are designated as follows:—

3 Heavy Reserve Cavalry Regiments. 1 Saxon Reserve Reiter Regiment.

1 Guard Reserve Dragoon Regiment.

11 Reserve Dragoon Regiments (numbered 1 to 8, 12, 13 and Württemberg).

10 Reserve Hussar Regiments (including 1 Saxon).

1 Guard Reserve Ulanen Regiment.

8 Reserve Ulanen Regiments (including 1 Saxon).

1 Reserve Jäger zu Pferde Regiment. 3 Bavarian Reserve Cavalry Regiments.

The uniform varies for the different types of regiment, as follows:-

Cuirassier and dragoon regiments wear a tunic and spiked helmet.

Hussar regiments wear a braided Attila, fur busby, and shoulder cords instead of shoulder straps. (See Plate 3.)

Ulanen regiments wear a double-breasted tunic (Ulanka), lance-cap (Tschapka), and rounded shoulder-straps. (See Plates 3 and 9.)

Saxon *Ulanen* regiments wear ordinary shoulder straps. Bavarian *Chevaulegers* regiments wear a spiked helmet.

Jäger zu Pferde regiments wear a grey-green uniform similar to that of Jäger battalions. They wear a black steel helmet,

CHAPTER VIII.

ARTILLERY.

A.—Field Artillery.

1. General organization.—Prior to mobilization there were 642 batteries of horse and field artillery, or rather less than 1 battery per battalion of infantry. This proportion has been slightly increased during the war, and there is now rather more than 1 field battery per battalion. The total number of field batteries at the end of 1918 was over 3,000.

Field artillery includes horse artillery (reitends Artillerie). Horse artillery is allotted to cavalry divisions (see page 74). Field artillery proper is entirely allotted to infantry divisions. It consists of—

Field gun batteries, equipped with the 7.7-cm. field gun, and Field howitzer batteries, equipped with the 10.5-cm. light field howitzer.

In peace, batteries consisted of 6 field guns or 4 light field howitzers, but during 1915 all field batteries were reduced to 4 guns, in order to provide material for new formations. In April, 1916, artillery establishments were still further reduced by withdrawing the lead horses from ammunition columns and transport wagons.

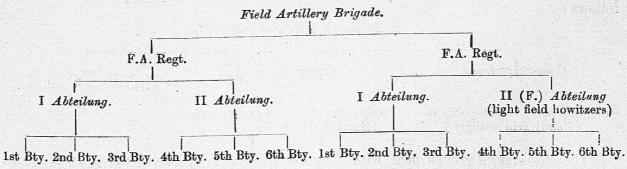
During 1916 a series of independent field artillery batteries, numbered from 801 to 915, was formed. These batteries have been used to reinforce the artillery of divisions on the Eastern Front.

2. Divisional artillery organization.—The artillery of an Active division was originally known as a field artillery brigade* (Feldartillerie-Brigade), usually commanded by a Major-General.

During the early stages of the war the divisional artillery organization varied some-

what in Active, Reserve and new-formation divisions.

In Active divisions, the field artillery brigade was organized as follows:-



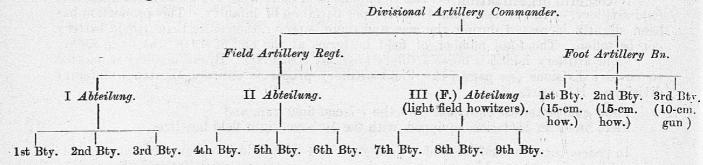
^{*} Not to be confused with the British Field Artillery Brigade of 3 or 4 batteries, the German equivalent for which is "Abteilung." The Major-General commanding a German Field Artillery Brigade corresponded to the C.R.A. of a British Division.

The Abteilungen were numbered I and II, and the batteries from 1-6 in each regiment.

The artillery of the divisions formed since mobilization was organized in a slightly different manner, and the number of batteries has been reduced from 12 to 9. These 9 batteries form one field artillery regiment, divided into three Abteilungen, two of which are equipped with field guns and the third with light field howitzers. This organization has now become general.

Since March, 1918, a foot artillery battalion (usually two 15-cm. howitzer batteries and one 10-cm. gun battery) has become an integral part of the divisional artillery.

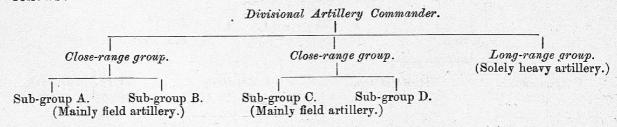
The divisional artillery consists, therefore, of 9 field batteries and 3 heavy batteries, and is now organized as follows:—



Field howitzer batteries now form $\frac{1}{3}$ of the total field artillery. In peace, field howitzer batteries formed $\frac{1}{8}$ of the total, as only one *Abteilung* in each Army Corps was equipped with light field howitzers.

3. Divisional artillery headquarters.—When the divisional artillery was reduced from 2 regiments, each of 6 batteries, to 1 regiment of 9 batteries, the field artillery brigade formation became eliminated. As, however, the divisional artillery commander is in command of all the artillery, heavy as well as field, allotted to the divisional sector, it was necessary to provide the division with a divisional artillery headquarters (Artillerie-Kommando), and one of these is now attached to each divisional headquarters.

The present system of organization under the divisional artillery commander is as follows:—



The close-range groups deal with forward areas and protective barrages, the long-range group with back areas and counter-battery work.

4. Independent field artillery regiments. During 1917, the reduction of the divisional artillery from 12 to 9 batteries was extended to all divisions, the surplus batteries

thus set free being used as a nucleus for providing the new formations with artillery, as well as to form a number of independent field artillery regiments.* These independent regiments, over 100 in number, form a General Headquarters reserve of field artillery, and are allotted to different sectors of the front as the situation requires.

In November, 1918, including both independent and divisional artillery regiments, the German Army comprised over 2,700 field batteries, compared with about 2,060 battalions of infantry.

5. Organization of a field battery (gun or howitzer).—A field battery is commanded by a captain (Batterie-Führer), and is organized in two sections (Züge), each commanded by a subaltern. There is a third subaltern to supervise ammunition supply, and a fourth to act as forward observing officer. Another officer is attached for transport duties.

The vehicles and transport of the battery are organized as follows:-

Firing Battery (Gefechts-Batterie).

4 guns or howitzers (6-horsed).

4 ammunition wagons (6-horsed).†
1 observation wagon (6-horsed).

1st Line Transport (Gefechts-Bagage).

4 led horses.

1 limbered store wagon (4-horsed).‡

1 travelling kitchen (2-horsed). 5 hand carts (for machine guns).

Train (Grosse Bagage).

1 store wagon (4-horsed).‡ 1 forage wagon (4-horsed).

1 supply wagon (4-horsed).

Battery Commander's Staff (Batterie-Trupp).

2 Unteroffiziere with director.

3 orderlies (1 with the stereo-telescope and 1 with signalling flags).

2 mounted telephonists.

All the above carry small spades and wire cutters.

Each battery has two '08 pattern machine guns on auxiliary mountings for close and anti-aircraft defence. The personnel is provided by the battery, and 3,300 rounds of ammunition in belts are carried on the hand carts.

One bicycle was allowed for each battery in 1917, in order to save the wear and tear of horses.

The establishment of a battery is:

6 officers.

21 non-commissioned officers.

64 gunners.

45 drivers.

A total of 6 officers and 130 other ranks.

† The firing battery wagons are known as the Staffel.

‡ One of these two store wagons is only included in a horse artillery battery, and not in a field artillery battery.

(6754)

^{*} These regiments are being equipped with mechanical transport (Kraftwagen-Staffel) to facilitate their rapid transfer ind-pendently of railways. The mechanical transport Echelon consists of an headquarters and three sections. Each section is intended for the conveyance of a Field Artillery Abteilung, and consists of 35 lorries plus the necessary motor vehicles for personnel.

6. Field artillery training. — Field artillery training in the German Army is supervised by an inspector of practice camps (Inspekteur der Artillerie-Schiessschulen, or General von der Artillerie Nr. 1). He ranks as an Army Artillery Commander.

The central School of Gunnery (Artillerie-Schiessschule) is at Jüterbog, south of Berlin,

where there is a depôt field artillery brigade (Ersatz-Feldartillerie Brigade Jüterbog).

There are four regular practice camps in the occupied portion of France, and two on the Eastern Front. Each of these camps has a divisional artillery headquarters permanently allotted to it for the purpose of command and training. These headquarters are as follows:—

Camp.	Artillery Command.	Transferred from
Maubert-Fontaine (west of Charleville) Thimougies (east of Tournai) Sebourg (east of Valenciennes) Ciney (south-east of Namur) Grodno	5th	5th Division. 1st Guard Reserve Division. 28th Reserve Division. 4th Ersatz Division. 80th Reserve Division. 86th Division.

Temporary camps are formed as required, e.g., at Beverloo and Exacrde.

At each practice camp there is a permanent depôt Abteilung. These are numbered in a series commencing with 1001, and sometimes send up batteries to reinforce the artillery in battle sectors.

7. The field gun.—There are two patterns, viz., the 1896 n/A. and the 1916 field guns.

The 1896 n/A. field gun (see Plate 17 at end).—The 1896 n/A. pattern field gun (Feldkanone 96 n/A.) is the old 15-pr. converted to a Q.F. gun. It is mounted on a shielded recoil carriage.

(a.) The gun.—The gun consists of an inner tube, rifled with 32 grooves, the rear half of the inner tube being covered by a jacket which is shrunk on and secured by a screw ring half-way between breech and muzzle. The breech end of the jacket is shaped to take the breech wedge, and has a lug for the attachment of the recoil buffer. Three recoil guides, shrunk on to the gun, enable it to recoil along the buffer slide.

The single-motion wedge breech action has an axial striker. The breech lever is

placed above the breech and is actuated from the right side of the gun.

(b.) The carriage.—The upper carriage consists of the cradle, buffer-cylinder and traversing gear. The recoil buffer and running-out springs are contained in the cradle and are placed beneath the gun. The cradle pivots and traverses on a gimbal in the centre of the carriage axle itself.

The carriage is mounted on 4-ft. $5\frac{1}{8}$ -in. wheels. The wheel-track is 5 ft. The axletree carries a shield, which is 5 ft. 6 in. high when fully extended, and two axletree seats.

The box trail is provided with a spade and traversing lever, and carries two seats, one for the layer and one for the loader. The tyre-brakes are combined with a rope-brake on the axletree arms.

The horse artillery gun is the same as that of the field artillery, but no men are carried on the axletree seats,

(c.) The sights.—The sighting gear consists of a toothed arc tangent sight fitted with a panoramic dial sight (Rundblick-Fernrohr) and a collimator sight for direct laying. The tangent sight works in a sight-bracket on the left side of the cradle and is fitted with a bubble level. The graduations, which are on the lower face, extend from 1 to 60 in hundreds of metres, and from zero to something over 15 in degrees of arc. The only graduations on the degree scale which are marked are 0, 5, 10 and 15 degrees.

As the line of sight is not independent of the gun elevation, a corrector slide, interposed between the tangent sight and the sight bracket, enables the trajectory to be modified, thus altering the height of burst. Each corrector graduation is equivalent to an

alteration of $8\frac{1}{2}$ minutes in the angle of sight.

(d.) Vehicles.—The limber has a steel pole; the centre and lead horses are hooked to a master-bar on the point of the limber pole. Collars are used, but breast harness was introduced experimentally in July, 1917. Three men are carried on the limber. The box is of steel plate and holds 36 rounds* in baskets containing three rounds each. The total weight behind the team is about 43 cwt., including two gunners on the axletree seats and three on the limber.

The wagon body is of similar construction, but carries 54 rounds † Thus the wagon and limber carry 90 rounds, and the battery carries 504 rounds in all. In action, the wagon body is unlimbered on the right side of the gun, the perch being then supported by a prop. The shielded lid falls down to protect the gunners in action. Three men are

carried on the wagon limber and one on the wagon body.

Two store wagons (Vorratswagen) accompany the battery. One is limbered and carries rations, medical and veterinary chests, tools and spare parts. The limber carries ammunition. The other store wagon is 4-wheeled and carries the field forge, artificers' tools, spare clothing, equipment, and officers' baggage.

The 1916 field gun (see Plate 18).—Towards the close of 1916, some of the batteries then recently formed were equipped with a new field gun called K.i.H. (Kanone in Haubitzlafette or gun on howitzer carriage). Subsequently, a modified form of this design was introduced, which is known as F.K. 16 (Feld-Kanone 16 or 1916 field gun), and it is with this piece that field gun batteries are being re-armed. It has not, however, proved entirely satisfactory owing to its weight, and re-armament has only been carried out to the extent of 42 per cent. of the total field guns.

(a.) The gun.—The gun is similar in construction to the 1896 n/A. gun, but is about 2 feet longer. There is no difference in the breech mechanism.

(b.) The carriage.—The buffer and carriage are those of the '98/'09 light field howitzer, i.e., the cradle is mounted, like a cantilever on rear trunnions, on a small top carriage which is pivoted on the carriage proper. A double balance spring, seated on a transom on the carriage, thrusts against the cradle and supports the weight of the gun. The running-out springs have been strengthened, as have also the balance springs and the elevating gear; the recoil is on the constant long recoil system; a buffer stop has been provided to prevent damage to the breech mechanism at high angles of elevation.

A circular platform weighing 2.8 cwt. is placed underneath the wheels when in action. It is attached to the trail by two hinged rods. This platform ensures steadiness in firing and allows of a wide arc of traverse without disturbing the level of the wheels.

The upper part of the shield is detachable and the lower part hinged.

† Long shell are never carried in the wagon body.

^{*} When long shell are carried, the box holds 24 long shell and 6 ordinary shell or shrapnel.

- (c.) The sights.—The sights are the same as those of the '98/'09 light field howitzer, except for the graduations.
- (d.) Vehicles.—The vehicles are apparently the same as those hitherto in use. A spring coupling has been adopted for limbers. The circular platform is carried on the wagon body. A gun limber takes 24 shell and 24 cartridges. A wagon and limber take 60 shell and 60 cartridges, 54 super-charges and 20 flash reducers. Thus, the battery carries 336 rounds in all.

Details of the 1896 n/A., and 1916 field guns.—

Calibre	27·3 (None provided	1916 pattern 3·03 in. (7·7 cm.). 35 calibres (8' 10 ⁵ / ₁₆ "). 27·5 cwt. 2·8 cwt. 45 cwt.
gunners. Limits of elevation		- 12°, + 16°	-10°, + 40°*.
Amount of traverse	•••	8°	8°.
Weight of charges Rifling—		·7 lbs., 1·2 lbs.	1.06 lbs., 1.55 lbs.
Twist	•• 4.6	Increasing.	Uniform (1 in 21).
Number of grooves	• • • • • • • • • • • • • • • • • • •	${.}$ 4°—7° $\frac{9}{2}$	8° 25′. 32.

	'96 n	A. gun.	1916	gun.
	Reduced charge.	Full charge.	Charge No. 1.	Charge No. 2.
Muzzle Velocity. 1915 shell	not fired	f.s. 1,526 not fired 1,526	f.s. 1,365 not fired 1,411	f.s. 1,795 1,975 not fired
Maximum Ranges (in yards). 1915 shell	not fired	8,312 not fired 7,655	6,562 * not fired 6,562	9,952 11,702 not fired

8. Field gun ammunition.--†

(a.) Projectiles:—

(i.) 1896 n/A. gun.—Fixed ammunition is used. Three rounds are packed in a basket, the total weight being 60 lbs. The following types of shell were in use during

^{*} The practical limits are -9° 30' and $+38^{\circ}$.

[†] For further details regarding ammunition and range tables, see "Notes on German Shells," Second Edition (S.S. 120) and "Notes on German Fuzes," Second Edition (S.S. 306).

the campaign of 1917; those which became obsolete and were no longer in use in 1918 are marked "obsolete":-

1914 cast iron H.E. shell, with bursting charge of 0.4 lb. of amatol, issued with reduced propellant charge only (obsolete).

1915 (short) H.E. shell with bursting charge of 0.84 lb. of amatol or picric acid, or

with a reduced bursting charge of 0.5 lb.

1916 H.E. shell with bursting charge of 0.77 lb. of picric acid.

Long H.E. shell with bursting charge of 2 lbs. of amatol. 1916 and long gas shell (Blue, Yellow and Green Cross; see page 105).

1896 pattern (converted) shrapnel, containing 300 lead bullets or 220 steel bullets. Star shell Leuchtgeschoss L/3.8 (i.e., 3.8 cal. long). Maximum range, 4,812 yards.

The long shell weighs 16.2 lbs. with pointed fuze, and 15.8 lbs. with round-nosed fuze; similarly, the 1915 pattern weighs either 15.5 lbs. or 15 lbs. The 1916 pattern weighs 13.8 lbs. only. Gas shell vary in weight from 15-15.5 lbs., according to the fuze and the filling.

(ii.) 1916 gun.—Separate ammunition is used. Of the above-mentioned shell, the 1915, 1916 and long H.E., the 1916 and long gas and the 1896 (converted) shrapnel are fired by the new gun. In addition, a streamline H.E. shell, with instantaneous fuze and tapered base (C-Geschoss), has been introduced for use at long ranges; it weighs 13.4 lbs. only, and has a comparatively small bursting charge (1.2 lb.). Its splinter effect is stated to be better than that of the long H.E. shell. When firing (a) 1916 H.E., only Charge No. 1 (reduced) is to be used, (b) 1916 gas shell, only Charge No. 2 is to be used.

Smoke producers.—33 per cent. of all field gun H.E. shell, i.e., one in each basket, contain a smoke producer. The other two shell in a basket, which do not contain a smoke producer, are marked with a vertical black stripe.

(b.) Fuzes (1896 n/A. and 1916 guns):—

Features of interest.—As regards percussion fuzes, the non-delay type of fuze has been replaced by an instantaneous fuze and a delay action fuze. Instantaneous action is obtained by means of a projecting striker rod, which is inserted before loading. The original fuzes were "direct" action fuzes only. Latterly, a "graze" action has been added, so that if the striker rod fails to act, or is not inserted, the shell will detonate with "non-delay" action. These fuzes are marked "bew." Fuzes are now made pointed, being struck with a radius of about 6 calibres. Zinc alloy and steel are employed to the exclusion of copper (brass). Safety powder pellets have been discarded for centrifugal bolts.

The following patterns are now in use:—

Dopp. Z. 96 n/A.—An old round-nosed T. & P. fuze, made of aluminium; graduated in metres of range up to 7,000 m. (7,655 yards). Used with the 1896 pattern (converted) shrapnel.

K.Z. 11 Gr.—Ditto, graduated up to 7,200 m. (7,874 yards). Used with H.E. shell, particularly with the 1915 pattern, against aircraft (in which case it contains no

percussion system).

L.K.Z. 11 Gr.—A pointed T. & P. fuze, made of zinc alloy, latterly with a cast-iron point; graduated formerly up to 7,200 m. (7,874 yards) and more recently up to 5,000 m. (5,468 yards) only. Used with the 1915, 1916 and long H.E. shell.

L.K.Z. 16 m. V.—A delay action fuze, enclosed in a cap of mild steel, designed for

penetrating earth cover, &c. Used with the 1915, 1916 and long H.E. shell.

E.K.Z. 16.—A pointed fuze, made of zinc alloy; the prototype of all German instantaneous fuzes. It is issued closed at the top by a lead seal, which is torn off just before loading and a short rod of steel or magnesium inserted. On impact this rod drives the needle on to the percussion cap and so detonates the shell. Used with the 1915, 1916 and long H.E. shell.

E.K.Z. 16 C.—A long tapered variation of E.K.Z. 16, used with the streamline shell. E.K.Z. 17.—Identical in shape to the above, but the point is made of cast iron. The simplicity of its mechanism marks a revolution in German principles of fuze design. It is stated to be liable to cause prematures in the bore. Used with all field gun shell.

K.Z. 14.—This is the original round-nosed non-delay action fuze used with the 1914 and 1915 shell; it is now obsolete. A later pattern, K.Z. 14 n/A., was used until recently

with the 1914 cast-iron H.E. shell.

A picric acid exploder wrapped in paraffined paper, and contained in a steel gaine, is used with fuzes employed with H.E. shell. A powerful detonator is embedded in the picric acid. The gaine usually screws into the lower portion of the fuze.

- (c.) Charges.—(i.) 1896 n/A. gun.—The charge consists of a nitro-cellulose propellant made up in the form of tubes. The normal charge is generally used, but for economy in propellants the 1914 and 1915 H.E. shell have been issued with a reduced charge. As the result of an increasing shortage of cotton, at first a quarter and latterly a half of the propellant has been replaced by a mixture called Ammonpulver. This consists of 15 per cent. carbon and 85 per cent. ammonium nitrate. It has the appearance of a black conglomerate and is made up in slabs. Owing to its great hygroscopicity this mixture produces irregular shooting, and may be regarded as an unsatisfactory substitute.
- (ii.) 1916 gun.—Cartridges are issued separately packed in baskets containing three cartridges. The cartridge case as formerly issued contained the normal charge (Gebrauchsladung), the upper portion of which was in a bag and could be removed when a reduced charge (kleine Ladung) was required. The super-charge was issued separately. Since the introduction of Ammonpulver, which is extremely sensitive to damp and must be issued hermetically sealed, a full and reduced charge have been issued separately, which are known as No. 2 and No. 1 respectively; no supercharge is issued. Flash reducers are used for night firing.
- 9. The light field howitzer.—The '98/'09 light field howitzer (see Plate 19 at end).—This light field howitzer (leichte Feldhaubitze 98/09) is the old 1898 pattern field howitzer entirely remodelled and mounted on a shielded recoil carriage.
- (a.) The howitzer.—The howitzer has a single-motion wedge breech with axial striker, and the construction in general is similar to that of the field gun, but on some of the older howitzers the breech lever works from front to rear instead of from right to left. The bore is rifled with 32 grooves. The twist of the rifling is increasing, from 1 in 35 to 1 in 15 calibres.
- (b.) The carriage.—The carriage is a shielded recoil carriage. The buffer is on the constant long-recoil system with running out springs. The cradle is on rear trunnions with a balance spring in front. The wheels are 4 feet in diameter, and the wheel-track is 5 feet.
- (c.) The sights.—The sighting gear is somewhat more complicated than that of the field gun, but carries a similar panoramic dial sight. The oscillating sight bracket has a

range drum graduated in metres for each of the 8 charges, so that elevation is given in terms of the range. As in the case of the field gun, slight alterations to the elevation can be made by means of a corrector (*Regler*). Each corrector graduation is equivalent to an alteration of $13\frac{1}{2}$ minutes in the angle of sight.

(d.) Vehicles.—The wagon and limber are similar to those of the field gun, except that the shell-baskets are carried upright instead of on their side. Each basket carries two complete rounds, and weighs 79—84 lbs. The limber carries 24 rounds and the wagon (with limber) carries 53. Thus, the battery carries a total of 328 rounds.

The 1916 light field howitzer (see Plate 20 at end).—The 1916 pattern is merely the old '98/'09 howitzer modified in order to obtain increased range. The piece was lengthened from 11:9 calibres to 22 calibres. The size of the chamber was increased. The buffer, recuperator and carriage were strengthened, an additional charge was introduced and a streamline shell adopted. The net result was an increase in weight (in action) of $4\frac{1}{2}$ cwt. and an increase in range of 3,953 yards.

The Krupp light field howitzer.—This is an entirely new model and in many details of design differs widely from the 1916 pattern. Compared with the latter, the piece is 2 calibres shorter and is mounted differently. There are two balance springs instead of one, an elevating screw in lieu of elevating arcs, while the top carriage is pivoted in rear instead of in front. As regards the carriage, the trail is about 2 ft. longer, the axle is cranked and there is no fixed spade. The breech mechanism is identical with that of the 1916 light field howitzer. Both howitzers fire the same ammunition, but the Krupp howitzer fires an additional super-charge, No. 10, and outranges the 1916 pattern by 547 yards (500 m.). Streamline shell are used for long range fire with the super-charges only. Shell with a false cap are not in use.

Details of light field howitzers:-

	'95/'09 pattern.	1916 pattern.	Krupp pattern.
Calibre	10·5 cm. (4·13")	10.5 cm. (4.13'')	10.5 cm. (4.13").
Rifling (grooves)	32	32	32
Length of howitzer	11 '9 calibres	22	20.3
Weight of howitzer in action	22½ cwt.	27 cwt.	- 1. 1. 16 P. 11 17
Weight limbered up without gunners	37 cwt.	45 cwt.	50 cwt.
Limits of elevation	$-13^{\circ}, +40^{\circ}$	-10° , $+40^{\circ}$	45°
Amount of traverse	4°	4°	4°
Number of charges	8	9*	10+
Weight of full charge	1 ·1 lb.	1 ·44 lb.	1 ·88 lb.
M.V. with full charge	1,083 f.s.	1,322 f.s.	1,411 f.s.
Maximum range (in yards)			Car males a second
Shrapnel (time)	7,655	9,186	9,597
1915 and long H.E. shell (per- cussion).	7,655	9,186	9,597
Streamline H.E. shell (percussion) (C-Geschoss).	Not fired.	10,635	11,155

^{*} In reality there are only 7 different charges, as No. 1 is not used alone and No. 8 does not exist.

† In reality there are only 8 different charges, for the reasons given above.

- 10. Light field howitzer ammunition.*—All light field howitzers fire separate ammunition.
 - (a.) Projectiles.

(i.) '98/09 howitzers.—The following types are now in use:-

1914 H.E. cast-iron shell, with bursting charge of 0.66 lb. (Obsolete in 1918). 1915 H.E. shell, with full bursting charge of 3.3 lbs. of amatol, or a reduced bursting charge of 0.77 lb.

Long H.E. shell, with full bursting charge of 4.0 lbs. of amatol, or a reduced

bursting charge of 3.3 lbs.

Long gas shell (Blue, Green and Yellow cross; see page 105).

1916 pattern shrapnel, containing 300 lead bullets, or 450 steel bullets.

The above shell weigh about 34.5 lbs. each.

Star shell (Leuchtgeschoss L/3.3 or star shell 3.3 calibres long); this shell bursts in the air like a shrapnel and releases a parachute from which a magnesium flare is suspended. Weight, 27.5 lbs.; maximum range, 4,740 yards.

(ii.) 1916 and Krupp howitzers:-

The 1916 and Krupp light field howitzers fire the same shell as the '98/'09 pattern howitzer, with the exception of the 1914 H.E. cast-iron shell. In addition, they fire a stream-line shell (C-Geschoss), similar in design to that fired by the 1916 field gun, and 35.3 lb. in weight.

Smoke producers.—50 per cent. of the H.E. shell contain a smoke producer. The other 50 per cent. (i.e., one in each basket) are marked with a vertical black stripe running

the full length of the shell.

(b.) Fuzes.—All light field howitzer shell are issued fuzed.

Features of interest.—

(i.) A considerable proportion of H.E. shell is issued with T. and P. fuze.

(ii.) The introduction of instantaneous fuzes.

(iii.) The latest type of instantaneous fuze, E.H Z. 16, contains a graze pellet in addition to the direct action, and can be set for either delay or non-delay action.

(iv.) As regards materials, the employment of zinc alloy and cast iron to the exclusion

The following patterns are now in use: -

H.Z. 05 Schr. A T. and P. fuze graduated up to 7,000 m. (7,655 yards). Used with the 1916 pattern shrapnel.

H.Z. 05 Gr. Similar to the above, but made of brass and steel; can also be set for

delay action. Used with the long and 1915 H.E. shell.

H.Z. 16. A percussion fuze, made of zinc alloy with a steel cap, and painted grey; can be set for either non-delay or delay action by means of a setting stud. Used with the 1915 and long H.E. shell.

Round-nosed instantaneous howitzer E.H.Z. 16, E.H.Z. 17 and E.H.Z. 16 C. fuzes, similar as regards construction to the instantaneous field gun fuzes E.K.Z. 16, E.K.Z. 17 and E.K.Z. 16 C, described on page 86, except that E.H.Z. 16 has three actions as stated above under (iii.).

H.Z. 14 Fb. The original non-delay fuze, H.Z. 14, gained a reputation for causing prematures, which led to the addition of a centrifugal safety bolt, Fliehbolzen (abbreviated

^{*} For further details regarding ammunition and range tables, see "Notes on German Shells," Second Edition (S.S. 420), and "Notes on German Fuzes," Second Edition (S.S. 306).

to Fb. or Fliehb.). During 1917, the improved pattern was still used with the 1914 H.E. and the 1915 H.E. shell with reduced bursting charge, and the original H.Z. 14 fuze was still used with green cross gas shell. These fuzes became obsolete during 1918.

- (c.) Charges.—The charges of flaked powder (Würfelpulver) are made up in bags. Flash reducers are used. The cartridge case is either of brass or steel. The steel cartridge case proved a great disadvantage as, when the super-charges were used, it expanded and jammed in the chamber. As the streamline shell could only be fired with the super-charges, some batteries refused to fire it, and, in certain instances, the issue was stopped.
- 11. Firing platform.—The firing platform issued for use with 1916 field gun and 1916 and Krupp light field howitzers consists of a circular channel iron, made in several lengths, a pivot and a long steel peg for holding down the pivot. When assembled, the channel irons form a circular run way for the wheels. Weight of platform, 2.8 cwt.
- 12. Observation wagon and stores.—Every field battery is provided with a 6-horsed observation wagon. This wagon is unlimbered at the observing station and carries a tripod observation ladder with body-shield, admitting of observation from a height of 18 feet above the ground. The observation wagon carries also the "scissors" stereotelescope (Scherenfernrohr), range-finder (Entfernungsmesser), director (Richtkreis) and telephone equipment.

Directors, dial sights, &c., of the field artillery are graduated round the circle from 0 to 6400, the main circle being divided into 64 parts, and the 100ths added by means of a micrometer screw. The smallest division (*Teilstrich*) is equivalent to the French millième,

i.e., the angle subtended by 1 metre at 1,000 metres (= 3.375 minutes).

In the foot artillery the unit of angular measurement was formerly one-sixteenth

of a degree (=3.75 minutes), and dial sights, &c., were graduated from 0 to 5,760.

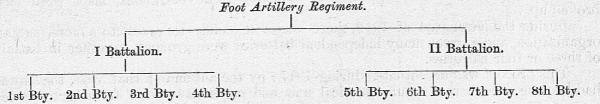
A War Ministry order, dated 25th December, 1916, pointed out the inconvenience due to the existence of two systems of graduating sights, directors, &c., and laid down that, in future, the foot artillery would adopt the system of graduation hitherto used by the field artillery. New sights of all natures of gun and howitzer are now graduated in accordance with this system.

In point of fact, this inconvenience still existed at the end of 1918, and at least six different methods of numbering graduations on artillery dial sights have been met with.

In each field artillery Abteilung, and in each battery, there is a telephone squad (Fernsprech-Trupp); in peace each telephone squad was equipped with two army telephones and 3,280 yards of army cable, but this allowance has certainly been increased during the war.

B.-Foot Artillery.

1. Peace organization.—Prior to mobilization, the German Army comprised 24 foot artillery regiments (i.e., one per Army Corps District). The regiments were designed for employment as Corps artillery, and were organized as follows:—



The armament consisted of 15-cm. heavy field howitzers and 21-cm. mortars. Battalions equipped with 21-cm. mortars had only two batteries.

The strength of the German heavy artillery on mobilization amounted to about 400 batteries.

Most of the foot artillery regiments had, in peace, one or two Bespannungs-Abteilungen (draught-horse detachments), which were attached in turn to each battery in order to train the personnel for mobile operations.

2. Expansion during the war.—The expansion of the foot artillery has been the most remarkable feature in the increase of the German Army during the war. In January, 1918, there were nearly $5\frac{1}{2}$ times as many heavy batteries as existed in peace. This total was slightly reduced later, but in November, 1918, the estimated total of German foot artillery batteries was more than five times the peace-time total.

On mobilization, each Active foot artillery regiment formed a Reserve regiment, which

was soon ready to take the field.

As the production of guns increased, each foot artillery regiment also formed a Landwehr regiment, and some of the batteries of the Ersatz (depôt) battalions and Landsturm battalions of regiments have also appeared in the field.

The number of battalions in a regiment has also been raised, some regiments having

three, four or even five battalions.

In addition to the batteries belonging to Active, Reserve, Landwehr, Ersatz and Landsturm foot artillery battalions, a number of independently numbered foot artillery batteries were formed in 1915 and 1916, numbered from 101 to 150 and from 200 to 800. A great many of these batteries were equipped with the armament of captured fortresses, or from the fortresses in Germany, and were not horsed. A number were also equipped with the old 9-cm. field gun. Independent battalions, numbered from 21 upwards, were also formed. The battalions numbered from 21 to 28 were subsequently expanded into regiments.

During 1916, the series of high-numbered batteries greatly increased, and a new series of foot artillery battalions, numbered from 40 upwards, was formed. These battalions consisted of three batteries. Some of their batteries were merely formed by renumbering existing batteries of the independent series and providing them with horses.

There was a similar expansion in the Bavarian Army.

A considerable number of naval long-range batteries were added to the Field Army during 1916 and 1917. From 1917 onwards, too, a new series of Landwehr battalions of

six batteries each, numbered from 34 to 77, was formed.

By the beginning of 1918, the total number of foot artillery batteries in the field had risen to about 2,250. The heavy losses of 1918 led to the dissolution of a certain number of batteries, and the total number in the field in November, 1918, was about 2,070.*

3. Distribution and allotment of foot artillery units.—The distribution and allotment of foot artillery units in the field have varied in the different phases of the war.

After a few months' fighting, the rigid organization of peace-time disappeared completely. The foot artillery regiment ceased to exist as a tactical unit, and only remained as part of the designation of batteries. The battalions, also, were largely broken up.

During the latter part of 1916, there was a tendency to revert to a more permanent organization, and a great many independent batteries were grouped together in battalions

of three or four batteries.

This process was accentuated during 1917; by the autumn of that year, the battalion had become once mere a regular tactical unit and moved, as a rule, from sector to sector

^{*} Practice camps have been formed at Hirson (transferred to Gembloux), Maubeuge (transferred to Liège) and Strasburg-Insmingen.

with the batteries forming part of it. This was particularly the case with the independent battalions; but battalions nominally forming part of regiments, also, frequently had

batteries belonging to those regiments under them.

When the operations of 1918 opened, a further reversal in the direction of the old permanent organization was carried out. A foot artillery battalion was allotted to each division as an organic part, like the field artillery regiment and the pioneer companies, and accompanied the division from one sector to another. These divisional battalions normally consist of three batteries, two of 15-cm. howitzers and one of 10-cm. guns. They are selected indifferently (as regards Prussian units) from among the independent battalions and from among the battalions of Active and Reserve regiments.

Generally speaking, the following principles are observed in the allotment of foot

artillery batteries:-

(a.) Batteries are allotted to certain sectors of the front in accordance with the tactical objectives or the situation at the moment. The normal allotment is 8 or 9 heavy batteries to a quiet divisional sector, and 16 on an active battle front. These batteries sometimes form mixed groups with the field batteries.

(b.) The heavier calibres and long-range guns on railway mountings are grouped together for counter-battery work or for special tasks under higher commanders.

(c.) Batteries other than those included under (b) or permanently attached to divisions, are all under the orders of the divisional artillery commander in whose sector they are placed. When the division moves, the batteries remain in position.

In battle sectors, a Corps headquarters is frequently given a special artillery staff (Artilleriestab zur besonderen Verwendung), which keeps in touch with the various divisional artillery staffs in the Corps, and directly controls the Corps long-range heavy artillery

At the headquarters of every Army there is an artillery adviser (General von der

Artillerie).

4. Organization of foot artillery batteries.—The organization of foot artillery batteries varied very considerably according to the calibre. The following table shows the normal number of pieces in German foot artillery batteries according to their calibre, as established by recent documents, and their establishment:-

Nature of battery.	Number of guns or howitzers.	Officers.	Other ranks.	
10-cm. gun*		2 2 4 3 1 1	8 8 8 8 5 5 5 5	199 199 174 199 199 152 133 133 133

^{*} The establishments given for these units are those of horsed batteries. The establishment of a foot artillery battery which is not horsed (of all calibres below 21-cm. mortars) is 5 officers and 131 other ranks.

În the last two or three months of the war, the shortage of material, and the heavy losses in guns, compelled the Germans to reduce the number of pieces in their 15-cm howitzer batteries from 4 to 3, and in the 21-cm. mortar batteries from 3 to 2.

Machine guns.—Every foot artillery battery is provided with two '08 pattern heavy machine guns on auxiliary mountings for close and anti-aircraft defence. These machine guns and their ammunition are carried on 5 hand carts drawn by men of the battery; 3,300 rounds of ammunition in belts are carried in 18 ammunition boxes.

Observation wagons.—Every foot artillery battery is provided with a four-horsed observation wagon, 1902 pattern (Beobachtungswagen 02). One of these wagons is also allotted to the headquarters of every foot artillery battalion. This observation wagon is longer than that of the field artillery, but its total weight when loaded is less.

5. Armament of foot artillery batteries.—The proportion of guns to howitzers in the German foot artillery is approximately—

The heavy guns in commonest use are-

10-cm. (4·1-inch) gun.

13-cm. (5·3-inch) gun.

15-cm. (5.9-inch) gun (of various types).

24-cm. (9·4-inch) naval gun.

There are a few batteries of 21-cm., 28-cm., 30.5-cm., 35.5-cm. and 38-cm. guns of naval origin.

The calibres of the heavy howitzer batteries have been standardized to a much greater degree than in the case of the heavy gun batteries. The two standard calibres are—

15-cm. (5.9-inch) howitzer, forming 50 per cent. of the total armament of the foot artillery.

21-cm. (8·3-inch) mortar, forming at least 20 per cent. of the total armament of the foot artillery.

A few heavy howitzer batteries of 28-cm. (11-inch), 30.5-cm. (12-inch), and 42-cm. (16.5-inch) calibre exist, but they are comparatively rare.

The Germans, in most cases, use the term "mortar" (Mörser) for howitzers of 21-cm. calibre and upwards.

6. The 15-cm. heavy field howitzer.—As stated above, 50 per cent. of the German foot artillery is equipped with 15-cm. heavy field howitzer batteries. There are four patterns of 15-cm. heavy field howitzer (schwere Feld-Haubitze).

Particulars of 15-cm. heavy field howitzers.

	Original pattern. (s.F.H.)	1902 pattern. (s.F.H. 02)	1913 pattern. (s.F.H. 13)	Long 1913 pattern. (lg.s.F. H. 13)
Calibre Rifling, grooves Length of howitzer Weight of howitzer with breech block. Weight of carriage Weight limbered up, without gunners. Weight of howitzer in action. Limit of elevation Amount of traverse Number of charges Weight of full charge M.V. with full charge Maximum range with full charge.		14.97 cm. (5.89"). 36 12 calibres. 15\frac{3}{4} cwt. 23\frac{1}{2} cwt. 53\frac{1}{2} cwt. 39\frac{1}{4} cwt. 0, \circ +42\circ 3\circ 56' 6 2.6 lbs. 1,066 f.s. 8,147 yards.	14.97 cm. (5.89"). 36 14 calibres. 15½ cwt. ? ? ? 0,°+45° about 4° 7 3.0 lbs. 1,196 f.s. 9,296 yards.	14.97 cm. (5.89"). 32 17 calibres. 16½ cwt. 26¾ cwt. 26¾ cwt. 0,°+45° about 4° 8 3.3 lbs. 1,237 f.s. 9,296 yards (2 c.r.h shell) 9,624 yards (7 c.r.h shell)

- (a.) The original howitzer.—The howitzer is mounted on an old type of heavy limbered carriage. The recoil is checked by means of tyre brakes, actuated by wire ropes which wind round the inner flanges of the wheels. The howitzer need not be fired from a platform, but in soft ground, mats are placed under the wheels and trail.
- (b.) The 1902 howitzer.—The howitzer (see Plate 21) is mounted on a recoil carriage with spade, buffer and running-out springs. The recoil is on the constant recoil system. The cradle rotates on trunnions placed in front of the carriage axle. The carriage is not shielded.

The howitzer has a single-motion wedge breech action with an axial striker. It is fitted with a dial sight but not with an independent line of sight. The range drum is graduated in degrees from 9° to 42°, and also in metres of range for each of the six charges.

Six gunners are carried on the limber, but no ammunition.

- (c.) The 1913 howitzer.—This is an improved type (see Plate 22) with increased range and steadiness when firing. Howitzers of recent manufacture are fitted with an air recuperator (Luftvorholer). The recoil is on the constant recoil system. The cradle is mounted on rear trunnions, the weight of the forepart of the howitzer and cradle being taken up by two balance springs placed one on either side of the top carriage. The carriage is provided with a shield, and the wheels with girdles.
- (d.) The long 1913 howitzer (see Plate 23) embodies the following noteworthy features in its design:—

A very long piece, rear trunnions, air recuperator, variable recoil, 8 charges, a hinged

spade. The howitzer consists of a single tube, 17 calibres long, over which are shrunk a muzzle ring, two guide rings, and a breech jacket. The breech is of the usual German

sliding wedge type, with axial percussion striker.

The cradle is mounted on a top carriage on rear trunnions, placed only 20 inches from the face of the breech. The trunnions are vertically above the carriage axle. Two balance springs, one on either side of the cradle, take the weight of the piece. The maximum length of recoil is about 59 inches.

The top carriage is pivoted in front of the carriage axle on the carriage proper.

The carriage proper is remarkable for the length of the trail. It is fitted with a hinged shield, in which the usual central shutter has been replaced by a hood. The spade is hinged on an eccentric, and can be clamped both when folded up and when let down. The carriage is mounted on wooden wheels, 49 inches in diameter, fitted with $4\frac{1}{2}$ -inch tyres.

The sights are mounted on an oscillating bracket and are canted to allow for drift. The range drum is graduated in hundreds of metres for 8 charges and also in degrees.

7. Ammunition wagons.—Eight ammunition wagons, each holding 12 rounds in the limber and 24 rounds in the wagon body, are allotted to a 4-gun battery. No ammunition is carried in the gun limbers. The total for the battery is thus 288 rounds.

8. Ammunition of the 15-cm. heavy field howitzer.*—

(a.) Projectiles.—The projectiles in common use are—

1912 and 1912 n/A. (long) H.E. shell with bursting charge of 13.4 lbs. of trinitro-

anisol and dinitrobenzene.

1912 (verst.) H.E. shell, of medium length with bursting charge of 10.14 lbs. of amatol. This shell is a compromise between the long and the short shell. It was introduced during 1918.

1914 (short) H.E. shell with bursting charge of 5.5 lbs. of amatol.† This shell is the

most employed.

1914 (short) H.E. cast iron shell with bursting charge of 3.1 lbs. of amatol and

1917 H.E. shell with bursting charge of 7 lbs. Up to the conclusion of hostilities, this shell had not been met with, but a diagram of it appears in the German ammunition handbook. It is shown as a short shell about $2\frac{1}{2}$ calibres long, fitted with the latest type of zinc and copper driving bands. The head is about 3 c.r.h.

Gas shell (Green, Yellow and Blue Cross, see page 105). Originally, the 1912 (long) shell case was used for gas shell, then the 1912 n/A., and latterly, during

1918, the 1912 (verst.) shell case.

Shell of most recent manufacture are fitted, for reasons of economy, with a broad zinc driving band, below which is a very narrow copper driving band.

In order to obtain increased range with undiminished accuracy, the 1914 (short) H.E. shell, which has a 1 calibre head, is now fitted with a hollow pointed false cap made of thin

^{*} For further details regarding ammunition and range tables, see "Notes on German Shells," Second Edition (S.S. 420), and "Notes on German Fuzes," Second Edition (S.S. 306.).
† This shell has recently been found filled with a mixed charge of trinitroanisol and dinitrobenzene.

mild steel. This cap is struck with a radius of about 7 calibres. The length of the shell has been increased from 3 to $4\frac{1}{2}$ calibres. The consequent increase in range is only 328 yards. This shell is only fired from the long 1913–15-cm, heavy field howitzer and using the full charge, No. 8.

All five patterns of H.E. shell weigh about 92 lbs.; the gas shell weighs about 95.5 lbs. Each shell is packed in a separate basket, the total weight being about 100 lbs.

A proportion of H.E. shell contain smoke producers and are marked on the shoulder with a black "R" (Rauchentwickler).

(b.) Fuzes.—The ammunition is issued fuzed, with the exception of Green Cross 2 and Yellow Cross gas shell. For these, the Gr. Z. 92 or Gr. Z. 17 fuzes are issued in boxes of 25, and the exploders in separate boxes containing 4 or 5.

Striker rods for instantaneous fuzes are issued separately in boxes of 40.

The following fuzes are now employed with all four patterns of 15-cm. howitzers:

Dopp. Z. 15 (umg.).—Time and percussion fuze, which can be set for either delay or non-delay action; made of brass and steel; graduated up to 41 seconds. Used with the 1912, 1912 n/A., and 1912 (verst.) H.E. shell.

- Gr. Z. 04.—A percussion fuze, made of brass or of white metal and steel; can be set for either non-delay or delay action. Used with the 1912, 1912 n/A., 1912 (verst.) and 1917 H.E. shell.
- Gr. Z. 14.—Made of brass and steel; a simplified variation of the above; non-delay action only. Used formerly with the 1914 H.E. shell.
- Gr. Z. 14 n/A.—The improved pattern of Gr. Z. 14, from which it can be distinguished by the thin plate riveted over the top of the body; a centrifugal safety bolt is provided in addition to the safety powder pellet. Used with the 1914, 1914 (Haube), and 1917 H.E. shell and with 1912 (verst.) and 1912 n/A. gas shell.
- Gr. Z. 17.—An instantaneous fuze, made of steel and white metal. It has a projecting striker rod like the E.K.Z. 17 (see page 86). Used with the 1912, 1912 n/A., 1912 (verst.), 1914 and 1917 H.E. shell, and with all recent types of gas shell.
- Hbgr. Z. 17.—An instantaneous fuze similar in design to the above, but for use with the 1914 H.E. shell with false cap. A long wooden striker rod is used; it is inserted through the point of the false cap, which is issued closed with a screw plug.
- (c.) Charges.—The charges of flaked powder (Würfelpulver) are made up in bags. The cartridge cases, formerly of brass, are now made of steel; they are packed in flat baskets containing 6 apiece. Flash reducers are used for night firing.
- 9. The 21-cm. mortar.—Apart from various patterns of obsolete bronze mortars, the three following patterns of German 21-cm. mortar exist:—
- (a.) "21-cm. mortar" (21 cm. Mörser or 21 cm. Mrs.).—Dating from 1902; an obsolete piece, in use, however, during the war.
- (b.) "Mortar" (Mörser or Mrs.).—Introduced in 1910 and still being issued in 1917; the piece with which most 21-cm. mortar batteries are equipped.
 - (c.) "Long mortar" (langer Mörser or lg. Mrs.).—The latest pattern,

Particulars of 21-cm. Mortars.

		21-cm. Mortar. (21 cm. Mrs.)	Mortar. (Mrs.)	Long Mortar. (lg. Mrs.)
Calibre	ech block.	64 10 calibres 59 cwt. 36 cwt. 4 tons, 15 cwt6°, +70° 17 (11)* 6.8 lbs.	21 ·1 cm. (8 ·3") 64 12 calibres. 51\frac{3}{4} 3 tons, 15 cwt. 7 tons, 5 cwt. 0, +70° 4° 9 12 ·3 lbs. 1,203 (1,332)† f.s. 10,280 (9,952)† yards.	21·1 cm. (8·3") 64 15 calibres. 52½ cwt. 3 tons, 15 cwt. About 8 tons. 0, +70° 4° 8 11·46 lbs. 1,227 (1,368)† f.s. 11,155 (10,280)† yards

(a.) The 21-cm. mortar (original pattern).—The carriage is provided with travelling wheels, but in action these are replaced by small firing wheels or trucks, which only project as far as the prolongation of the lower surface of the trail. In action, the carriage rests on a platform constructed of two layers of baulks of timber. The recoil is checked by two movable inclined planes, which are placed on either side of the carriage so that the firing trucks have to run up them when the carriage recoils.

For purposes of transport, the mortar is dismounted from its firing carriage and placed on a special wagon. The firing carriage, when fitted with its transport wheels, is attached

to a special limber.

(b.) The "Mortar."—The Mortar (see Plate 24) consists of a single tube, over which are shrunk a guide ring, a plain ring and the breech jacket. The breech is a sliding wedge breech, with axial percussion striker. The axis of the bore when horizontal is about 5 feet 3 inches above the ground level. A tray, handled by 4 men, is used for loading. The shell is rammed by hand, the men standing on the trail. On the march, the mortar is carried on a special wagon.

The cradle encircles the piece. The buffer is placed above the mortar. The cradle rotates on rear trunnions on a top carriage. This admits of a constant long recoil. The weight of the piece is taken by a helical balance spring, mounted on a gimbal placed some

14 inches in front of the carriage axle.

The top-carriage is pivoted on the carriage proper immediately in rear of the carriage

axle.

The carriage has a trail 14 feet 9 inches in length, measuring from the carriage axle. It is mounted on steel wheels 4 feet 7 inches in diameter, with $4\frac{3}{4}$ -inch tyres. The brake shoes act on both faces of inner flanges on the wheels. Girdles are used on soft ground and for firing. Wicker mats are also issued to place beneath the wheels. The shield is detachable.

^{* 17} charges are used with the 1896 pattern shell, and 11 with the 1914 and 1914 A patterns. † The figures in brackets refer to the 1914 and 1914 A (short) shell, the other figures refer to the 1896 and 1896 n/A. (long) shell,

The sights are mounted on an oscillating bracket and canted so as to allow for drift. The range drum is graduated in degrees and in hundreds of metres for 9 charges, for both low and high angle fire.

(c.) The "Long mortar."—The new 21-cm. howitzer (see Plate 25) or "Long mortar" (lg. Mrs.) merely differs from the "Mortar" by the length of the piece, which has been increased from 12 to 15 calibres; the corresponding increase in range is 875 yards.

Ammunition wagons.—Three ammunition wagons, each holding either 12 long shell or 15 short shell, are allotted to a 3-gun battery. The total for the battery is thus either 36 long shell or 45 short shell.

10. Ammunition of the 21-cm. mortar.*—(a) Projectiles.—The "Mortar" and "Long mortar" fire the same shell. The shell used with all 21-cm. mortars are supplied fuzed. Gas shell of recent pattern are, however, issued unfuzed. Each shell is packed in . a separate basket.

The following patterns of shell are in common use:-

1896 n/A. (long) H.E. shell with bursting charge of 40.4 lbs, of T.N.T.

1914 (short) H.E. shell with bursting charge of 17.0 lbs. of amatol. 1914 A (short) H.E. shell with bursting charge of 13.9 lbs. of amatol.

1917 (long) H.E. shell with bursting charge 31.5 lbs. of amatol.

1896 n/A. (long) and 1917 (long) type gas shell (mostly Yellow Cross, see page 105).

The 1896 n/A. and 1917 shell weigh about 262 lbs., and the 1914 and 1914 A shell about 184 lbs.

(b.) Fuzes.—Only percussion fuzes are used.

kz. Bd. Z. 10.—Base fuze made of brass and screwed into a steel gaine; can be set for either non-delay (0 V.), short delay (1 V.), or long delay (2 V.). Used with the 1896 n/A. and 1917 H.E. shell.

Gr. Z. 04 and Gr. Z. 04/14.—Made of brass and steel; nose fuzes. They can be set for either delay or non-delay action. Used with the 1914 and 1914 A (short) H.E. shell.

Gr. Z. 92.—An old-fashioned nose fuze made of brass. Used with the 1896 n/A. gas shell. This is a base-fuzed shell which has been plugged and the point of the shell cut off and tapped to receive a nose fuze.

Gr. Z. 17.—An instantaneous fuze made of steel and white metal. It has a projecting striker rod like the E.K.Z. 17 (see page 86), used with the 1914 and 1914A H.E. shell, and

1917 gas shell (Blue Cross).

- (c.) Charges.—The charge is of powder in flat rings, made up in bags. Cartridge cases are of brass or steel, and are packed in flat baskets containing 2 apiece.
- 11. Howitzers and mortars of 28-cm. and larger calibres.—These include the following: -

28-cm. (11-inch) howitzer on travelling carriage.

28-cm. (11-inch) coast defence howitzer.

30.5-cm. (12-inch) heavy coast defence howitzers '98 and '09.

30.5-cm. (12-inch) Austrian howitzer.

30 5-cm. (12-inch) Krupp howitzer.

42-cm. (16.5-inch) mortar.

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^{*} For further details regarding ammunition and range tables, see "Notes on German Shells," Second Edition (S.S. 420) and "Notes on German Fuzes," Second Edition (S.S. 306). (6754)

Information concerning the projectiles, maximum ranges, &c., of these weapons, is contained in "Notes on German Shells," Second Edition (S.S. 420).

30:5-cm. Austrian mortar.—The following is a rough description of the 1911 pattern. There is also apparently a later pattern which is 14 calibres long and has a maximum range of 13,124 yards.

The mortar recoils within a circular cradle of cast steel. Above the cradle are the two buffer cylinders, below it are the three cylinders of the hydro-pneumatic recuperator. The central cylinder contains glycerine, the other two glycerine and compressed air.

The *cradle* is mounted on trunnions on a carriage formed by two upright members braced in front and mounted on a circular steel base. The latter is pivoted on a circular mounting bolted to a rectangular steel platform.

The *platform* is built up in the form of 3 flat boxes laid side by side and connected by hinges. On the march the central box is laid flat on the truck, the two others hanging vertically on either side.

The mortar with its platform is transported on 3 vehicles hauled by one 100 h.p.

Daimler tractor. The mortar is also known to be transported on a motor truck.

The following particulars refer to the 1911 pattern:-

Calibre 30.5 cm. (12"). Rifling 68 grooves. • • Length of mortar ... 10 calibres. about 7 tons. Weight of mortar ,, 10 ,, Weight of carriage... Weight of platform.. $... + 45^{\circ}, + 75^{\circ}.$ Limits of elevation 120° on platform, 60° without platform. Amount of traverse... Maximum range .. 10,499 yards. Weight of shell 838 lbs. . . . 77 lbs. Weight of bursting charge ... Weight of propellant (full charge) 26.4 lbs. .. 1 round every 6 minutes. Rate of fire ..

- 30.5-cm. German mortar.—Krupp manufactures a mortar similar to the Austrian mortar described above. About 10 of these batteries are reported to have been identified on the Western Front. A battery consists of two mortars.
- 12. 10-cm. guns.—Three patterns of German 10-cm. guns, known respectively as 10-cm. gun'04; 10-cm. gun'14 and 10-cm. gun'17, were in use in the foot artillery at the end of 1918. These are successive models of a 40-pr. long range, high velocity gun on wheeled carriage. They all fire the same ammunition. Older patterns of the 10-cm. gun are the 10-cm. gun and the 10-cm. gun'97, the latter being practically identical with the 10-cm. gun'14.

The 1904 gun.—The principal details of the '04 pattern gun (see Plate 26) are as follows:—

 Calibre
 ...
 ...
 ...
 10.5 cm. (4.13").

 Length of gun
 ...
 ...
 30 calibres.

 Weight of gun
 ...
 $26\frac{1}{2}$ cwt.

 Weight of carriage
 ...
 $27\frac{3}{4}$ cwt.

 Weight limbered up without gunners
 ...
 69 cwt.

The breech is of the single-motion vertical wedge pattern. The firing device consists of a striker actuated by a lever and counter-spring. The gun is mounted on a recoil carriage fitted with a hydraulic buffer, running-out springs, and trail with spade. The buffer is below the gun and is pivoted on a cradle; the trunnions of the latter being in front of the axle of the carriage. There is no shield. The sighting arrangements are similar to those of the 7.7-cm. field gun (see page 83).

The 1914 gun.—The 1914 gun (see Plate 27) made its appearance on the Western Front during 1915, and by the end of 1917 was in general use. The length of the piece was increased from 30 to 35 calibres, which resulted in an extra 1,000 yards range, and the adoption, during 1918, of a 10 c.r.h. shell with a false cap added a further 2,000 yards to its range. The gun is mounted on rear trunnions according to the modern German system and the recoil is variable. One feature of design which distinguishes the 1914 gun is that it is fitted with an independent line of sight. The 1914 gun can be identified by the horizontal rod across the top of the breech.

The 1917 gun (see Plate 28).—The independent line of sight was, apparently, found to be unnecessary, and with the 1917 gun a return was made to the ordinary system. The length of the piece has been increased to 45 calibres, and in general design this gun closely resembles the 1916 pattern 15-cm. gun. The maximum range is stated by prisoners to be only 15,311 yards, but this appears to be a very low estimate for a 45-calibre gun.

As is the practice with all modern German guns and howitzers on wheeled carriages,

the 1914 and 1917 10-cm. guns are provided with shields.

There are three further patterns of 10-cm. gun, known, according to their mounting, as 10-cm. gun with overhead shield, 10-cm. gun in turret, and 10-cm. reinforced gun in turret, which fire the same ammunition as the above, with the exception of the most modern shell, the 1915 H.E.

The 10-cm. coast defence gun on wheeled carriage is also employed against land targets, firing a shell known as the "1916 pattern H.E.," with a bursting charge of 4 lbs. and a maximum range of 16,295 yards. This is separate ammunition. The propellant charge weighs 15.4 lbs. With the reduced charge of 9.9 lbs., the maximum range is 12,249 yards.

Ammunition wagons.—(1914 and 1904 guns.) Eight ammunition wagons each holding 56 rounds are allotted to a 4-gun battery. The total for the battery is thus 448 rounds.

13. Ammunition of 10-cm. guns.*—(a.) Projectiles.—Originally fixed ammunition was fired but this is now obsolete; separate ammunition is now issued. The shell fits loosely in the mouth of the cartridge case. The weight of a complete round of fixed ammunition was approximately 53 lbs. The projectiles now in use are as follows:—

"10-cm. H.E. shell" with bursting charge of 1.48 lbs. of pieric acid. 1914 H.E. shell with bursting charge of 1.98 lbs. of amatol.

^{*} For further details regarding ammunition and range tables, see "Notes on German Shells," Second Edition (S.S. 420), and "Notes on German Fuzes," Second Edition (S.S. 306).

(6754)

1914 A H.E. shell with bursting charge of 1.54 lbs. of amatol.

1915 H.E. shell with bursting charge of 4 lbs. of picric acid.

1915 H.E. shell with false cap with bursting charge of 4 lbs. of picric acid.

1896 shrapnel, containing 680 lead bullets.

Each of the above projectiles weighs 39.5 lbs.

(b.) Fuzes.—The following fuzes are used:—

Dopp. Z. 92 f. 10 cm. K., also marked Dopp. Z. 92 K. 15.—An old-fashioned T. and P. fuze made of brass, graduated up to 26 seconds. Used with shrapnel. Maximum range, 9,296 yards.

Dopp. Z. 92 lg. Brlg.—An improved variation of the above, graduated up to 41

seconds. Used with shrapnel. Maximum range, 12,085 yards.

Dopp. Z. 15 (umg.).—A variation of the Dopp. Z. 15; for description, see page 95.

Dopp. Z. 16 o. Az.—Clockwork time fuze with no percussion system. The fuze setter is graduated in seconds and quarters of a second up to 60. Used with the 1915 H.E. shell with false cap.

H. Z. 14 Vorst and K.Z. 16 f. 10 cm. K.—Percussion fuzes. Used with the 1914 and

1914A H.E. shell.

Gr. Z. 04.—Percussion fuze (delay and non-delay action). Used with the 1915 H.E. shell.

Gr. Z. 17.—Used with 1915 H.E. shell, see page 95.

Hbgr. Z. 17.—This fuze is similar to the Gr. Z. 17, but is for use with shell with a false cap. The striker rod is of wood and is longer than the metal striker rod required by the Gr. Z. 17.

- (c.) Charges.—The charge consists of a propellant similar to cordite, made up in the form of tubes. Three charges are used with the 1917 gun, two with the 1914 and 1904 guns. The reduced charge for the 1914 and 1904 guns is made by withdrawing the central bag from the full charge. The cardboard cover of the cartridge case should be replaced before loading. The reduced charge is used whenever possible. The cartridge cases are of brass or steel.
- 14. The 13-cm. gun.—(a.) The gun.—The 13-cm. gun (see Plate 29) is a long-range, high-velocity gun which was introduced before the present war to replace the 15-cm. long gun. The principal details are given below:—

Calibre 13.5 cm. (5.31"). Total length of gun $15' 6\frac{1}{2}'' = 35$ calibres. Weight of gun in action ... 114 cwt. Weight of carriage.. 55 cwt. Limit of elevation ... Amount of traverse Weight of charge ... 22.5 lbs. Weight of reduced charge Muzzle velocity with full charge ... 2,264 f.s. Maximum range-Percussion (H.E. shell) 18,045 yards. Time (shrapnel) 15,748 yards.

The gun recoils on a cradle, which is pivoted on a top-carriage. The latter is mounted on the carriage proper on forward trunnions.

The gun consists of an "A" tube, a "B" tube, and a jacket, over which are shrunk three rings. The recoil guides are secured to the gun by screws. The breech is of the usual Krupp single-motion sliding-wedge type. The gun is fired by a self-cocking axial percussion striker.

(b.) The cradle and carriage. The cradle, containing the hydraulic buffer and running-out springs, is placed below the gun, and is pivoted in a small top-carriage. The recoil is constant, and has a normal length of about 52 inches.

The top-carriage is a U-shaped steel casting, mounted on forward trunnions on the

carriage proper.

The carriage proper consists of a trail formed with flanged steel sides connected by transoms. In addition to a small fixed spade, there is a large hinged spade (shown folded). The wheels are either of wood or steel. The shield is hinged and folds back flat on the gun. The carriage brakes consist of shoes working on both faces of inner flanges on the wheels, and are operated by the hand-wheel in front of the carriage. The hand-wheels operating the elevating and traversing gears are mounted on the left of the gun.

(c.) The sights.—The sighting arrangements are similar to those of the 1896 n/A.

field gun (see page 83).

Ammunition wagons.—Three ammunition wagons, each carrying 32 rounds, are allotted to a 3-gun battery. The total for the battery is thus 96 rounds.

15. Ammunition of the 13-cm. gun.*—(a.) Projectiles.—Shell and cartridge are separate. The projectiles in common use are as follows:-

13-cm. H.E. shell, with bursting charge of 7.7 lbs. of T.N.T. (Obsolete.) 1914 pattern H.E. shell, with bursting charge of 5.5 lbs. of T.N.T.

13-cm. shrapnel, containing 1,170 lead bullets.

The above projectiles weigh about 89 lbs. each.

(b.) Fuzes.—lg. Bd. Z. 10.—Percussion base fuze, made of brass; can be set for non-delay (0. V.), short delay (1 V.), and long delay (2 V.) Used with the 13-cm. H.E.

Gr. Z. 04.—This fuze is used with the 1914 H.E. shell; for description, see page 95. Gr. Z. 14.—Percussion nose fuze, non-delay action only, made of brass and steel; used

with the 1914 H.E. shell.

Gr. Z. 17.—This fuze is used with the 1914 H.E. shell; for description, see page 95. Dopp. Z. 92 f. 10 cm. K.; also marked Dopp. Z. 92 K. 15.—An old-fashioned T. and P. fuze, made of brass; graduated up to 26 seconds. Used with shrapnel; maximum range (time), 10,936 yards.

Dopp. Z. 92 lg. Brlg. and Dopp. Z. 92 n/F.—Improved variations of the above; graduated up to 41 seconds. Used with shrapnel; maximum range, 15,748 yards.

(c.) Cartridge cases.—These are of brass or steel.

16. Older patterns of guns employed by the foot artillery.—A certain number of foot artillery batteries are armed with guns of older patterns. Particulars of those which are most commonly in use are given in the table below; all four types are mounted on old-fashioned non-recoil carriages.

^{*} For further details regarding ammunition and range tables, see "Notes on German Shells," Second Edition (S.S. 420) and "Notes on German Fuzes," Second Edition (S.S. 306).

Particulars of guns of older patterns.

dies vige Total en en dies vige	9-cm. field gun '73/'88. (9 cm. K.)	12-cm. heavy gun. (s. 12 cm. K.)	15-cm. gun with chase rings (Ringkanone).	15-cm. long gun. (lg. 15 cm. K.)
Calibre	8.8 cm. (3.46") 23.9 calibres 8½ cwt. 15 cwt.	$12 \cdot 03$ cm. $(4 \cdot 7'')$ $23 \cdot 4$ calibres $25\frac{1}{2}$ cwt. $22\frac{1}{2}$ cwt. $66\frac{1}{2}$ cwt.	14.97 cm. (5.9") 23 calibres 61\frac{1}{4} cwt. 37\frac{1}{2} cwt.	14.97 cm. (5.9") 30 calibres 664 cwt. 52 cwt. 76 cwt.
Limits of elevation	-10° +41°	-5° -+40°	- 5° + 35° and + 37°	- 4° + 40°
Weight of charge (single charge of flaked powder, similar to cordite, contained in bag).	1 ·5 lbs.	2 ·9 lbs.	6 lbs.	8 ·8 lbs.
Muzzle velocity Maximum range—	1,450 f.s.	1,280 f.s.	1,499 f.s.	1,640 f.s.
Time Percussion	7,109 yards 7,109 yards	7,218 yards 7,984 yards	7,546 yards 8,640 yards	8,968 yards 10,936 yards

Certain 9-cm. batteries are known to have been re-armed with captured French and Belgian 12-cm. guns, and others with 15-cm. howitzers, but the guns are probably still allotted to sectors as anti-tank and infantry guns.

There is also a "Long 15-cm. gun with chase rings" (lg. 15 cm. R.K.) which fires the same ammunition as the Ringkanone, but its maximum time and percussion ranges are 7,655 and 8,749 yards, respectively.

17. The 15-cm. experimental gun on wheeled carriage (15 cm. Vers. K.i.R.L. or 15 cm. Versuchs-Kanone in Rad-Lafette).—A long-range gun which made its appearance in 1916. The gun is rifled with 48 grooves. The pitch of the rifling is 7°. (For ranges, see diagram to face page 106). It fires the following ammunition:-

1903 H.E. shell, with bursting charge of 7.2 lbs. of T.N.T. and Gr. Z. 04 fuze (see page 95).

Ditto, with false cap (7.5 c.r.h.) and bursting charge of 8.1 lbs.

1903 shrapnel (grey) and 1903 shrapnel (grey) with false cap.

The T. and P. fuzes Dopp. Z. 92 f. 10 cm. K., Dopp. Z. 92 K. 15 and Dopp. Z. 92 lg. Brlg. (see page 101) formerly used with this shrapnel have been superseded by the clockwork fuze Dopp. Z. 16. This fuze is remarkable for its cheapness, simplicity and accuracy. Its introduction has rendered practicable the engagement of kite balloons by heavy guns firing at very long ranges (20,000 yards and upwards).

18. The 15-cm. gun '16 (see Plate 30 at end).—This is a modern German gun of the latest type with a range of 24,934 yards, which was introduced in the winter of 1917-18. During the German offensives in the spring of 1918, the long range of these

guns was utilized to the full for shelling towns behind our front. There are two models, both on wheeled carriages, one made by Krupp and known as 15 cm. K. 16 Kp., the other made by the "Rheinische Metallwaren-Fabrik" at Düsseldorf, and known as 15 cm. K. 16 Rh.

The principal details are given below:—

				15 cm. K. 16 Kp.	15 cm. K. 16 Rh.
Calibre			1219/1	14:07 (5:00//)	
Total length of gun		••	••	14.97 cm. (5.89")	14 '93 cm. (5 '88")
No. of grooves			• •	43 calibres (21' 0 ·6")	42 '9 calibres (21' 0")
Weight of gun with breech block	••	••		48	48
Weight of firing carriage and limber.	••	• •		4 tons (?)	4 tons, $5\frac{3}{4}$ cwt.
Weight of gun in action	. •		••	7 tons, 4½ cwt.	5 tons, $12\frac{1}{2}$ cwt.
Weight of travelling wagon and gun.	dodina		Statistic	(3)	9 tons, 64 cwt.
LIMILS Of elevation	enternational			8 tons, 3 cwt.	6 tons, $3\frac{1}{4}$ cwt.
Amount of traverse	• •	••	••	0°, 46°	-5° , $+42^{\circ}$
Weights of charges—	••	• •	•••	7° 52′	4° 56′
· Full.			1/1	9 7 - 0 11	ra francist and Si
. Medium		110-10	18057	27 ·8 lbs.	28 ·66 lb.
Reduced	1.755/1	dann'		24 '7 lbs.	25 ·57 lb.
Muzzle velocity—		• •	••	19 ·6 lbs.	20 ·5 lb.
With full charge and 1916 15-cm.	ян	shall	with	(9)	ALL STAY JUSTONIA
false cap.	. 11.15.	SHCII	MIDIT	(P)	2441 f.s.
With medium charge and ordinary	7 ceh	нв	eholl	(2)	
With reduced charge and ordinary	7 crh	HE.	shell	adovat A (P) sekrosom	2251 f.s.
Maximum ranges—	. 0.1.11.	. 11.15.	SHEIL	method (?) tithosi a	1804 f.s.
With full charge and 1903 15-cm.	H E	ahall	with	94.094	
false cap.		PHOII	MILIT	24,934 yards.	24,934 yards.
With medium charge and ordinary	7 crh	ни	shell	10 948 vonds	10.040
With reduced charge and ordinary	7 crh	H E	ehall	19,248 yards.	19,248 yards.
0. dinary	. 0.1.11.	4.4.	опеп	15,201 yards.	15,201 yards.

Ammunition lorries.—(1916 15-cm. gun, Krupp). Four 4-ton lorries, each holding 48 rounds, are allotted to a 2-gun battery. The total for the battery is thus 192 rounds. (1916 15-cm. gun, Rhein. Met. Fab.) Four 1902 pattern wagons, each holding 31 rounds, are allotted to a 2-gun battery. The total for the battery is thus 124 rounds.

- 19. Ammunition of 1916 pattern 15-cm. gun.*—(a.) Projectiles.—The projectiles in use are as follows:-
 - 1903 H.E. shell, with bursting charge of 8.53 lbs. of cast T.N.T. (Fp. 02) or Di. $\frac{65}{35}$ + Fp. $\frac{60}{40}$,

1903 H.E. shell with false cap, with bursting charge of 8.53 lbs. of cast T.N.T. (Fp. 02).

1916 H.E. shell with false cap, with bursting charge of 10:58 lbs. (either cast T.N.T. or mixture of T.N.T. and amatol).

1903 shrapnel, containing 1,624 lead bullets set in resin.

1916 pattern shrapnel with false cap, containing 1,550 lead bullets set in resin.

The above shell each weigh from 110 to 115 lbs.

^{*} For further details regarding ammunition and range tables, see "Notes on German Shells," Second Edition (S.S. 420) and "Notes on German Fuzes," Second Edition (S.S. 306).

(b.) Fuzes.—Gr. Z. 04.—Used with all the above-mentioned H.E. shell; for description, see page 95.

Hbgr Z. 17.—Used with the 1903 and 1916 H.E. shell with false cap; for description,

see page 95.

Dopp. Z. 16.—Used with the 1916 H.E. shell with false cap, and with both the above-mentioned shrapnel shell. It is a clockwork fuze, and is set by a fuze setter which is graduated in seconds and quarter seconds up to 60. A corrector on the fuze setter is graduated in $\frac{1}{8}$ seconds.

Fuzes marked "o. Az." have no percussion system. They are used against aerial

targets.

- (c.) Charges.—The charges are made up of the 1912 pattern, tubular propellant, and are contained in a brass or steel cartridge case. Three charges are used—full, medium and reduced. The medium charge is obtained by withdrawing the bag marked "3" from the full charge; the reduced charge is obtained by withdrawing the two bags marked "2" and "3" from the full charge. For weights of charges, see table on preceding page.
- 20. Naval guns.—A large number of German naval guns were employed on the Western Front. These were either spares, or old guns from dismantled warships, or guns that were on order for foreign navies at the outbreak of war. They are mounted in three different ways, viz.:—

On wheeled road-carriage (in Rad-Lafette). On railway mounting (Eisenbahn-Geschütz). On platform mounting (Bettungs-Geschütz).

These are all Q.F. guns.

The guns most frequently identified are the 15-cm. Q.F. gun L/40 (see Plate 31 at end), and the 24-cm. Q.F. gun L/40.

Particulars of naval guns.

Pattern of gur	1.			10 ·5-cm. Q.F. gun.	15-cm. Q.F. gun.
German abbreviation	• •			10 ·5 cm., s.K.L/35 or	15 cm., S.K.L/40 or
Mountings		• 6	• •	s. 10 cm. K. On platform mounting or wheeled carriage.	s. 15 cm. K. On wheeled carriage
Rifling, grooves				32	44
Type of projectile	••	••		H.E., 2 c.r.h., nose fuze.	H.E., false cap, 10 c.r.h. with nose fuze.
Shell				38 ·36 lbs.	94.5 lbs.
H.E. bursting charge	••		• -	2.07 ,,	10:58 "
Full propellant charge	• •			6.39 "	20.28 "
Reduced propellant charge Maximum ranges—	••	••	••	None in use	11 .02 ,,
Full charge (time)				(H.E.), 13,107 yards	(H.E.), 20,451 yards
Full charge (percussion)				12,795 yards	20,451 yards
Reduced charge (percussion)				•••	11,400 ,,

PARTICULARS OF NAVAL GUNS (17-cm. UPWARDS).

A —ARTILLERY SUMMARY.

		battery.					Ammuniti	on.						Maximu		Rate of fire	Tim	e required	for—	Dimer	sions of at maxim	50 per cen	t. zone			
Type of gun.	.89	per bat			Shell.					lartridges		Maxi- mum height	Maxi- mum	wit)		of gun in	D 01	Bringing			at maxim	um range.		Arc of	Maxi- mum	
(Code name.)	groov	guns	Type of	Length	With or without	Weight.	Bursting	Designation of fuze.	Weig	ght of ch	arge.	of trajec- torv.	time of flight.	Full	Reduced	rounds per min-	Build- ing plat-	gun into		Full o	harge.	Reduced	charge.	traverse.	tion.	of piece.
	No. of	No. of	shell.	calibres.	false cap.	Weight.	charge.		Full.	Medium.	Reduced.			charge.	charge.	ute.	form.	On rails.	On plat- form.	Length.	Breadth.	Length.	Breadth.			
-cm. Naval Q.F. Gun L/40 (" R. L. Samuel")	\\ \\ \\\	2	H.E.	8	without	lbs. 141	lbs. 7 ·37	Kz.f. Spgr.m.K.	lbs.	lbs.	lbs.	yds. 6,693	sees. 66 7	yds. 17,498 15,201*	yds. 13,233	1	days. 2½	••		yds. 151	ı ds. 17 '9	yds 117	yds. 14·9	360°	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	ft. in
or ("E. Samuel")	/ "\	2	H.E.	4.7	with	1381	15	Kz,m.K. u.8t.	38 ·14	91.92	24 '91 }	9,722	81 .9	26,269 22,004*	17,607	1	:	10 minutes	••	340 ·1	17 9	177	13.6	26°	ĮJ -	
l-cm. Naval Q.F. Gun L/40 (" Peter Adalbert L/40")		1	H.E. H.E.	3 ·1 4 ·9	without with	238 253 ¹ / ₂	15.1	Bdz.f.	65 *04		{	7,403 9,865	70 · 5 83 · 4	19,576 27,975	::	} 1½	2-4			183 ·7 285	14.5 28.6	::		} 95°	45°	9 4:
l-em. Naval Q.F. Gun L/45 ("Peter Adalbert L/45")	. 60	1	H.E.	3 ·1 4 ·9	without with	238 253½	J .	Spgr. m.K.				7,787 10,236	72 85 4	20,450 28,872	::]				170 ·6 198	20 ·5 28 ·75		::	}		
em. Naval Q.F. Gun L/40 (" B. Theodor Karl")	1	1	H.E.	4.1	with.	333	34.4	Bdz.f. Spgr. m.K.			i	10,466	86 -8	29,090	28,239		3-6		••	280	43 1	196 '8	35	180°	1	10 0
(" E.B. Theodor Karl") .	72	1	Steel	4.1	with	888	4	Dopp.Z. C/16	99 -87		82.67	5,118		25,263	21,983	2	••		3 hours	240		153	{	as E. = 36/16 as B. = 180°	45° {	as E.= 9 5 as B.=10 2
(" E. Theodor Karl ") .	J (1]]] [10 minutes						4°	j	9 8
i-cm. Naval B.L. Gun L/30 (" E. B. Theodor Otto").	721	1	H.E.	4.1		. 333	34 .4	Bdz.f. Spgr. m.K.	64 -15			6,933	70	20,450						145	30			as E. = 58/16 as B. = 180°	45°	as E.= 9 5 ss B.=10 2
S-cm. Naval B.L. Gun L/40 ("E. B. Kurfürst")	80				-	633																		as E = $64/16$ as B = 180°	45°	as E.=10 9 as B.=10 21
3-cm. Naval Q.F. Gun L/40 ("E. B. Bruno")	84	1	H.E. H.E.	2·9 4·4	without with	529 683	35 54	Bdz.f. Spgr. m.K.	135 *58		{	8,202 10,193	74 ·6 85 ·7	21,928 30,348	::	2	3-6			208 416	16 9 42 8			as E. = 36/16 as B. = 180° (iron platform) 360° (concrete platform)	45	as E.=11 1 as B.=11 11
5'5-cm. Naval Q.F. Gur L/52'5. ("König August") .	72	1	L.H.E. H.E.	4.1	with	758½ 1179	61 ·1	$\left. \begin{array}{l} Bdz.f. \\ Spgr. \\ m.K. \end{array} \right\{$	577 ·61 496 ·04	429 -90	542 ·84 863 ·76	30,512 22,693	149 -4	€8,024 55,665	58,509 34,996	} a]			690 405	48 ·45 51 ·8	627 ·4 244 ·9	40 ·1 27 ·9	123°	52°	12 8
5/38-cm. Naval Q.F. GunL/4 (" König Luitpold")		1	H.E. H.E.	4·2 5·1	without with	1323	125 '3	Bdz.f. Spgr. m.K.	370 '38'	•	242 '51	12,467 13,780	94 ·9 100 ·6	36,965 43,308	28,872 82,700	} 8	uding erection of erane.	••	/	349 309	52·2 46·5	264 · 5 226 · 8	48 ·3 43 ·2	•	\$ 52° 45° ¶ 17° or 55°	••
6-cm. Naval Q.F. Gun L/4	5		H.E. H.E.	4·1 5·4	without with	1653½ 1638	} 145 · 5	Bdz.f. Spgr. m.K.	408 -45		264 -56	14,655 16,918	108 ·2 111 ·7	37,402 42,323	27,669 31,387	} 8	weeks] incluweeks]			388 465	43·2 51·6	244 ·9 294 ·1	30 ·5 37 ·6	Ì		
(" Max ")	. -		Steel Shrapne	3 · 4	without	1653}	14 '7	Dopp.Z. C/16			J	5,075			24,716 (with		1001-				•	263 -4		} 360°	45°	3 6
	100	1	L.H.E.	3.6	with	882	72 .3	Bdz.f. Spgr. m.K.	451 -95			22,026	132 -9	51,948	32 4/16°)		platform about			563	88 -9					
("E.B.Max")	.													As E., pro- visional 26,247 (17°)			Iron pl Concrete p	**	•					2°	as E. 17° as B. 55°	10 0

N.B.—In the designation of the mountings:

E.L. = Rad-Leftets or wheeled mounting.

E. = Etenhols no rollway mounting.

(on concrets or iron foundation).

E.B. = Etenhols no rollway mounting provided with central pivot on to which gun can be jacked down off the bogsys.

	у.											For	railway	moun	ting.												outside	of gun	
Type of gun.	a battery.		The	piece.		Average length of	Weight	Totol weight of	1	Vormal gas	ige truc	ks.	Maxi axle l	load.	Max rad	ius.		imum dient.		Excav	ation.		Time	required	d for mo	unting.	o usemson o	gth to bu	Remarks.
(Code name.)	No. of gans in	Len	gth.	We	night.	recoil.	cradle.	gun in action.	Number.	Type.	Load.	No. of axles.	When travelling.	When firing.	When travelling.	When firing.	When travelling	When firing.	Depth.	Width.	Length.	Cubic contents.	For excava- ation.	Iron plat- form.	Concrete platform.	Gun.	Distance be axles.	Maximum len from buffer	
-cm. Naval Q.F. Gun *L/40 (tractor-drawn). (". Motor Samuel.")	2	ft. 22	in. 7	tons 10	ewt. 12½	in. 15	tons ewt. 3 18%	tons cwt. 24 24	1		tons.		tons. 4 '92	tons.	ft.	ft.			ft. in. 2 10	ft. in. 1 7	ft. in. 19 8	e. yd. 7 •85	1	1		à	ft. in.	ft. in.	
cm. Naval Q.F. Gun L/40 (on railway mounting). ("Eisenbahn Samuel.")	2	22	7	10	121	15	3 183	59 1	2 10	8. G.	34·44 9·84		12.79 4.92		360	590	1 in 30	1 in 100											
cm. Naval Q.F. Gun L/40 (1901 pattern).† "Peter Adalbert.")	1	27	7	19	14	19½	with counter weight 10 24	108 14	2 1 3 1	G. S.S. ml.	14.76 19.68 24.60 29.52	,, 4						••	renr	front 21 4 rear 31 6	40 8	about 163 ·5	2	1		1			1 & 2 G. wagons for tools. 3, 4 & 5 S.S.ml. for platfor 6 S.S.ml. for baulks.
cm. Naval Q.F. Gun L/45 1906 pattern).† "Peter Adalbert.")	1	30	10	16	4	20½ to 21½	7 171	103 0	2 1 3	G. S.S. ml.	14 ·76 19 ·68 24 ·60	each 2 ,, 4 ,, 4							2 6 rear	front 21 4 rear 31 6	40 8	about 163 ·5	2	1		1			7 S.S.ml. for piece and cra
cm. Naval Q.F. Gun L/40† "Theodor Karl BGerüst.")	1				pattern 13			115 1	1 2 5 1	G. S.S. ml.	29 · 52 14 · 76 34 · 45 39 · 37	each 2							rear 5 10	30 6 middle 37 1 rear	36 1	257 ·7	3	2		1			1 & 2 G. wagons for tools. 3, 4, 5 & 6 S.S.ml. for platf 7 S.S.ml. for baulks. 8 S.S.ml. for piece and crad
-cm. Naval Q.F. Gun L/40† . "Theodor Karl E. und B Gerüst.")	1	31	4		& 1899 terns 44	231	10 19½	on railway mtng. 101 13½ on platforn mtng. 55 16	2	Bogey	96 45	total of 8	13 -78	26 -57	860	590	1 in	36	front 4 3 rear 5 10	front 30 6 middle 37 1 rear		257 -7	8	2		ŧ	52 0	60 5	1 wagon for gun. 1 & 2 G. wagons for tools. 3, 4, 5 & 6 S.S.ml. for platt 7 & 8 S.S.ml. for rails.
-cm. Naval Q.F. Gun L/40† ("Theodor Karl EGerüst.")	1]	-	24	81			108 91		ال	78 -74	total of 8	14-66	29 -03	360	590	1 in	36		30 6				.,			54 9	64 7	
-cm. Naval Q.F. Gun L/40 ("Turm Theodor Karl.")								on railway																					
-cm. Naval B.L. Gun L/30‡ ("Theodor Otto E und B Gerüst.")	1	28	7	18	14	381	with counte weight 17 0½	r- mtng. with shield 101 7½ on platforn mtng. 55 16	2	Bogey	96 -45	total of 8	13 -28	18 '70	360	590	1 in	36		odor Ks Ger	as for rl E u üst."	ind B					52 0	60 5	1 wagon for gun. 1 & 2 G. wagons for tools. 3, 4, 5 & 6 S.S.ml. for plat: 7 & 8 S.S.ml. for rails.
-cm. Naval B.L. Gun L/40‡ ("Kurfürst E und BGerüst."	1	36	9	48	161	36%	19 0	146 13 146 13	2			total of	14.76	18 -20	360	590	1 in	36	4 3 rear	front 30 6 middle 37 1		257 .7						70 11	1 wagon for gun. 1 & 2 G. wagons for tools.
c.em. Naval Q.F. Gun L/40 (189 pattern).‡ ("Bruno E und BGerüst.")	or.	36	9	44	113	304	14 18	55 16 for platform 147 12½ 55 16 for platform	2	Bogey	119 -08	total of	14.76	29 ·16	360	590	lin	36	4 3 rear	rear 30 6 front 30 6 middle 37 1 rear		257 .7					62 8	70 11	1 wagon for gun. 1 & 2 G. wagons for tools. 3, 4, 5 & 6 S.S.ml. for platt 7 & 8 S.S.ml. for rails.
5.5-cm. Naval Q.F. Gun L/52.5‡ (" König August.")	1	61	3	77	7 8½	491	25 6	196 16											10 10	30 6 54 1	54 1	850 -2	1						
/38-cm. Naval Q.F. Gun L/45‡ ("König Luitpold.")	-				7 17	494	26 17½										·· 		26 0		law mit	5498	1	weeks	about 7 weeks				There is no special mountit the 35/38-cm. gun. The may be mounted on the fi- ing mountings:— 1. "König August." 2. "Max B." (45°), 3. "Max E. & B." (17° o
S-cm. Naval Q.F. Gun L/45 "Max BGerüst.")	. 3	56	1	70	5 5½	493	26 17½	215 0				total o								dian — t	neter 30 ft.			exca	vation.				
S-cm. Naval Q.F. Gun L/45 . (" Max E und BGerüst.")	. 4	56	1	79	5 5½	491	26 171	265 142	4	Bogey	213 .2		14.76	29 .52	328	590	1 n	36	14 9	39 4 circu	39 4 dar pit	850 2				§			For concrete platform.

21. Ammunition of naval guns—

(a.) Projectiles.—All naval H.E. shell are painted yellow, usually with a black nose. Both shell and fuzes are stamped with a crown surmounted by a capital M. The bursting

charge of compressed T.N.T. or picric acid is in a millbeard container.

In order to obtain increased range with these naval guns, few of which were new, the old naval shell were fitted with a pointed false cap. The results were so satisfactory that new types of shell were adopted which had a pointed head struck with a radius of 10 calibres (10 c.r.h.). The latest type of long-range shell, evolved by the Germans, is the 17 cm. H.E. shell with pointed false cap (8 c.r.h.) and tapered base (1 in 7), with which a range of 26,269 yards is obtained. The shell complete with cap is 4.7 calibres long.

(b.) Fuzes.—Dopp.Z.S./43.—An old-fashioned T. & P. fuze, made of brass, graduated up to 43 seconds. Used with 10.5-cm. and 15-cm. H.E. shell.

Dopp. Z. 16.—Clockwork time fuze used with 24-cm. shrapnel (see page 102). There

are no graduations on the fuze. A graduated fuze setter is used.

Percussion nose fuzes of various patterns are used with 10.5-cm. 15-cm. and 17-cm. H.E. shell. These fuzes bear no marking. They are graze fuzes with centrifugal safety devices.

Spgr. m. K. = Sprenggranatenzünder mit Klappensicherung, i.e., fuze for H.E. shell, with centrifugal safety device; a percussion base fuze. The body is of lacquered steel and the cap and moving parts of brass. Used with 21, 24, 35.5 and 38-cm. H.E. shell.

22. Artillery gas shell.—During 1918 the following types of gas shell were in use:—

Type.	Filling.	Nature.
Green Cross	Diphosgene	Lethal.
Green Cross 1	Diphosgene with 30-66 per cent. chloropicrin	Lethal.
Green Cross 2	0. 0. 1	Causes sneezing in addition to lethal effect.
Green Cross 3 (Formerly called Yellow Cross 1).	Ethyldichlorarsine, ethyldibromarsine and dichlormethylether in varying proportions.	Lethal and irritating.
Blue Cross	Diphenylchlorarsine + H.E., or diphenylcyanarsine + H.E., or mixtures of the above, or diphenylchlorarsine 49—60 per cent. with N-Rthylcarbazol 60—40 per cent.	effect.
Yellow Cross		Lethal, and attacks the eyes and skin
Green Cross—H.E.	Diphosgene, with the addition of a high explosive bursting charge.	
Yellow Cross—H.E.	Dichlorethyl sulphide, with the addition of a high explosive bursting charge.	Lethal, and attacks the eyes and skin, in addition to H.E. effect.

Except for the fact that Green Cross 1 and Green Cross 2 are obsolescent, all these types of gas shell, except the H.E. varieties of Green Cross and Yellow Cross shell, are fired by each of the following guns:—

^{*} For further details regarding ammunition, see "Notes on German Shells," Second Edition (S.S. 420) and "Notes on German Fuzes," Second Edition (S.S. 306).

(7·7-cm.) field guns 96 n/A. and '16. (10·5-cm.) light field howitzers '98/'09, '16 and Krupp. 10-cm. guns '04 and '14. 15-cm. heavy field howitzers '02, '13, and long pattern '13. 21-cm. mortar, "mortar," and 21-cm. long mortar.

The Green Cross—H.E. and Yellow Cross—H.E. shell are fired by the 15-cm. howitzers and 21-cm. mortars only.

The 15-cm. long gun fires Yellow Cross gas shell only.

C.—Mountain Artillery.

No mountain artillery units existed in peace, although the requisite material was available to form several batteries. About 25 mountain batteries have been created during the war. They are grouped in *Abteilungen* of 3 batteries each, and are allotted to divisions operating in the Balkans, Carpathians, Alps and Vosges. The personnel of mountain batteries is drawn mainly from the mountainous districts of Bavaria, Württemberg and Baden.

A mountain gun battery (Gebirgskanonen-Batterie) consists of four 7.5-cm. Q.F. mountain guns. The gun has a single-motion wedge breech action and fires both shrapnel and H.E. shell. The recoil buffer is placed beneath the gun.

Mountain batteries are organized for pack transport. The gun and breech-block form

one load. A complete gun forms seven loads.

A few mountain batteries are armed with mountain howitzers. Mountain batteries are normally employed in independent sections.

Establishment of a section of a mountain gun battery (December, 1916).

2 lieutenants.

1 Vizewachtmeister.

6 Unteroffiziere.

1 mounted orderly (bombardier).

26 gunners.

31 drivers.

2 train drivers.

2 mountain guns.

31 mules, 10 riding horses.

The loads are distributed as follows:-

Mountain guns	(7 mules ea	ch)	1			14 r	nules.
Entrenching too						2	,,
Forge and farri					••	2	"
Observation sto				• • •		2	"
Medical equipm	ent	••		••	••	1	,,
Cooking equipm	ent	•	••	1.0	• •	2	>1
Ammunition	••	••	• • •	••	••	6	. 11
Spare.,	••	••	• •	• •	••	2	"
	Total				Y = 1	31	,,

[To tace page 106.

MAXIMUM RANGES OF GERMAN GUNS, HOWITZERS & MORTARS. FIELD ARTILLERY (a) FIELD GUNS (b) LIGHT FIELD HOWITZERS | 105cm LF.HY.10 | 150 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 | 1515 77-cm. Field Gun'96% 868 7814 8557 P. Storids St. D. S FOOT ARTILLERY (a) OBSOLETE MEDIUM RANGE GUNS (b) HEAVY FIELD HOWITZERS & MORTARS 9cmGun73/88 4921 Z109 Z218 THE RIE TUPSN-15-CM: " - " 13 TEPAUSMEN 3296 15-cm. 15 12-cm. Heavy Gun____ .15cm.LongGunwith ChaseRings_1685 sqr7 21-cm"Long Mortar_ _28-cm.Coast Defence Howitzer__ 305cm. Heavy Coast Defence Hov. '09_-42-cm.Mortar_ (c) LONG RANGE GUNS 10-cm Gun'14_ Maximum Ranges in Yards. T -with time fuze-P -with percussion fuze. fc. -false cap. C.P.Mtg -Central pivot mounting. Ry. Mtg. -Railway mounting. _10-cm.Coast Defence Gun on Wheeled Carriage . .10-5cm. Q.F. Naval Gun L/35_ _13-cm.Gun_ _15-cm.Gun on Coast Defence Mounting '07_ _15-cm. Gun 16 ____ 15-cm.Q.F.Naval Gun L/40___ _17cm.QF Naval Gun L/40 on Rly Mtg._ _2I-cm Q.F.Naval Gun L/45 on C.P. Mtg _____ _24-cm Q.F.Naval Gun L/40 on Rly: and C.P.Mtg._ _28-cm.Q.F.Naval Gun L/40 on RIy. and C.P.Mtg _ _35-5-cm.Q.F.Naval Gun L/52-5 on C.P.Mtg _ 38-cm QF Naval Gun L/45 on C.P.Mtg.

D.—Miscellaneous.

1. Close-range batteries.—A certain number of light field or fortress guns are employed by the Germans for defensive purposes in trench warfare. This form of defence was developed considerably during 1916 and 1917 in order to combat our tanks, but the experience of 1917 showed that these units were of no special value.

At first these units were equipped with 3.7-cm., 5-cm. and 5.7-cm. (Belgian) guns, and were known as Revolverkanonen-Abteilungen or Schützengrabenkanonen-Abteilungen. The personnel consisted partly of infantrymen and partly of artillerymen, the guns being

semi-permanently allotted to infantry regimental sectors.

During 1917 a series of 50 "infantry-gun" batteries (Infanterie-Geschütz-Batterien) was formed, armed with captured 7.62-cm. field guns.

The 3.7-cm. gun.—Two patterns of this gun exist:—

(a.) The 3'7-cm. revolver gun (3.7 cm. Revolver-Kanone).

(b.) The 3-7-cm, single-barrelled gun (3-7 cm. Schützengraben-Kanone).

The principal details of the revolver gun are as follows:—

3.7 cm. (1.45 inches). Number of barrels ... Calibre .. 119 cm. (16.9 calibres). Length of each barrel 12 grooves (uniform). Rifling .. 211 kg. (465 lbs.). 257 kg. (567 lbs.). Weight of gun Weight of carriage Limits of elevation ... $-10^{\circ}, +5^{\circ}$. Weight of propelling charge .. 0.0215 kg. (0.048 lbs.) Würfelpulver. Weight of shell ... 0.46 kg. (1.01 lbs.). 3,280 yards with common shell and market Maximum range 40 rounds per minute. Rate of fire

Ammunition.—Fixed ammunition is used. For use with the single-barrelled gun, the ammunition is belted. The following shell are fired by both guns:

3.7-cm. revolver gun, common shell (3.7 cm. Gr. (P.)). 3.7-cm. naval, H.E. shell (3.7 cm. Spgr.).

The maximum effective range against tanks is 600 yards.

The 5-cm. Q.F. gun on shielded mounting (5 cm. K.i.P.L.=5 c.m. Kanone in Panzer-Lafette) is an old-fashioned naval 6-pdr. gun on a central pivot mounting in an armoured turret. A number of these guns were mounted on the Belgian coast, and they were also used to assist in repelling tank attacks. They were issued with case shot, common shell and an armour-piercing H.E. shell, similar to that fired by the 7.7-cm. field gun.

The 7.62-cm. infantry gun (Infanterie-Geschütz or Inf.-Gesch.) is the Russian field gun (rifling, 24 grooves), which has been cut down from 30 to 16.4 calibres in length and fitted with new sights graduated up to 1,800 m. (1,968 yards) only. The gun is mounted on a recoil carriage on low wheels, 433 inches in diameter. It fires a 13-pdr. H.E. shell, of German manufacture, fitted with a non-delay action fuze (K.Z. 14).

"Infantry-gun" batteries are permanently allotted to each Army assault battalion. Otherwise, these batteries are generally employed either as anti-tank guns or as forward guns for close defence. Batteries allotted to assault units are used in support of raids and

other enterprises.

At the same time, another series of 50 "close-range" batteries (Nahkampf-Batterien) was formed, armed with the German 7.7-cm. field gun, mounted on low wheels, about 3 feet in diameter. The gun is on trunnions forward of the carriage axle, instead of being mounted directly on the carriage axle like the ordinary field gun.

Long shell with pointed fuze were employed against tanks, and also a special anti-tank

shell with hardened steel point and internal delay action percussion fuze.

Infantry-gun and close-range batteries consisted of-

2 officers, 60-70 other ranks, 6 guns.

They had neither transport nor horses. Normally one battery was allotted to each divisional sector on active fronts.

Captured orders issued in May, 1917, show that the German General Staff had found the 7.7-cm. close-range batteries unsuitable, and they were probably all withdrawn by the end of 1917.

There appears to be a tendency now to employ the small calibre guns, such as 3.7-cm. and 5-cm., for the close defence of artillery positions and for dealing with tanks which succeed in getting through the barrage.

- 2. Dummy batteries.—Maroons are employed for imitating both the flash and report of a German gun and the bursts of our shell. The German maroon has the appearance of a large ball of tarred string. It consists of a number of charges of powder (either smokeless or black) made up in boxes of thick cardboard, the whole being bound with several layers of tarred twine. The charges can be fired either simultaneously or at intervals, by means of safety fuse.
- 3. Smoke generators.—The Germans employ smoke generators based on the reaction of chlorsulphonic acid on lime, which produces a cloud of heavy white smoke.

 Three patterns of this type of smoke generator are in use:—

Designation.	Approximate	e dimensions.	Total	Weight of	Quantity of	
Designation.	Height.	Diameter.	weight.	lime.	chlorsulphonic acid.	
Nebel-Trommel N.T. (smoke drum) Nebel-Topf N.L. (smoke pot) Nebel-Kasten N.K. (smoke box)	ft. in. 2 4 3 0 1 4	ft. in. 1 7 1 3 1 2	lbs. 209 152 75	lbs. 63 39 24	pints. $37\frac{1}{2}$ $21\frac{1}{3}$ $15\frac{1}{2}$	

Each generator consists of an iron container (drum or sphere) filled with chlorsulphonic acid, which is suspended on trunnions in or above an iron drum containing lumps of quicklime.

The action of the acid on the lime produces an opaque cloud of white smoke, which is non-poisonous but causes a slight irritation of the throat.

These generators are used for forming smoke screens.

E.—Ammunition Supply.

1. First line.—(a.) Each infantry battalion is accompanied by four company small-arm ammunition carts (Kompagnie-Patronen-Wagen), each carrying 14,400 rounds.

(b.) Each field artillery Abteilung was formerly accompanied by a light ammunition column (leichte Munitionskolonne or leichte Feldhaubitz-Munitionskolonne), consisting of—

24 ammunition wagons (4-horsed) carrying 2,160 rounds (1,152 of long shell).
1 store wagon (4-horsed).
1 travelling kitchen (2-horsed).

A light ammunition column is divided into three sections. These columns no longer form part of field artillery Abteilungen, but in 1917 were grouped in the train echelons allotted to divisional and Corps sectors (see page 152).

(c.) Each horse artillery Abteilung (with a cavalry division) is accompanied by a light ammunition column consisting of—

14 ammunition wagons (4-horsed).

7 small-arm ammunition wagons.
1 supply wagon.
1 store wagon.

2 forage wagons.

1 travelling kitchen.

(d.) Each horse-drawn foot artillery battery is accompanied by a foot artillery battery ammunition column (12 ammunition wagons), which replenishes its supply from the ammunition refilling points. A horsed foot artillery ammunition column normally consists of—

12 ammunition wagons (4 horsed).

1 store wagon.
1 forage wagon.

1 forge wagon.

Some of these units are also Army troops. The heavier natures of artillery are provided

with mechanical transport.

In places where the ground is impassable for limbers, field artillery ammunition is packed on the battery horses. Each horse carries 240 lbs. of ammunition, *i.e.*, either 12 field gun shell in 4 baskets, or 6 light field howitzer shell in three baskets. In the latter case, the third basket is lashed on top of the saddle. Except for rope lashings, no special equipment is required (*e.g.*, canvas ammunition carriers).

2. Divisional ammunition columns.—Each division was originally provided with—

(a.) 2 infantry ammunition columns, and

- (b.) 3 or 4 artillery ammunition columns (one of which was a field howitzer ammunition column). There was one artillery ammunition column for each field artillery Abteilung in the division.
- (a.) Formerly, one infantry ammunition column was 6-horsed and the other was 4-horsed, but in April, 1916, they were all reduced to the 4-horse establishment,

The infantry ammunition columns were composed as follows:-

	1st Infantry Ammunition Column.	2nd Infantry Ammunition Column.	Vehicles.
	23	34	Small-arm ammunition wagons.
•	2	2	Store wagons.
	1	1	Field forge.
	1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Travelling kitchen.

(b.) The artillery ammunition columns are composed as follows:—

21 ammunition wagons (4-horsed).

2 store wagons (4-horsed).

1 travelling kitchen (2-horsed).

At the beginning of 1917, the infantry and artillery ammunition columns were all broken up and converted into "new pattern ammunition columns" (Munitions-Kolonnen n/A.). These, like the light ammunition columns, are now sector troops, and are grouped in the train echelons, described on page 152.

Foot artillery park companies are allotted to Armies and Corps for work in connection

with unloading ammunition and mounting heavy guns.

Ordnance repair workshops (Instandsetzungswerkstätten) exist at Thorn, Posen, Mainz, Metz and Cologne. They are under the control of the Munitions Supply Department of the War Ministry.

- 3. Ammunition tractors.—In addition to horse-drawn ammunition wagons and motor lorries, caterpillar tractors (*Tankautos*) are also employed for ammunition transport. The chassis of the tractor is identical with that of the German tank of the "Elfriede" type (see Plate 33). On it is mounted an open platform body with low sides. These tractors are also used for general haulage purposes.
- 4. Chain of ammunition supply.—The following table shows the chain of ammunition supply for a field battery (gun and howitzer) before the reorganization of the ammunition columns:—

Where carried.	Number of rounds per gun.	Number of rounds per howitzer.	
first line 4 wagon limbers, each 36 rounds (howr. 26) transport. limber of store wagon, 36 rounds (howr. 26) Light ammunition column (24 wagons)	•••	$ \begin{array}{c} 36 \\ 54 \\ 36 \\ 9 \end{array} $ 135 $ \begin{array}{c} 179 \\ 158 \end{array} $	$\begin{bmatrix} 24 \\ 32 \\ 26 \\ 6 \end{bmatrix}$ 88 $\begin{bmatrix} 116 \\ 101 \end{bmatrix}$
Total carried in division	•••	472	305

5. Expenditure of ammunition.—A large number of German documents, captured in 1917, lay stress on the necessity for economy in ammunition expenditure, often with reference to the abnormal expenditure on days of battle.

The following reasons are usually put forward in support of the necessity for

economy:-

(a.) Difficulties of production.

(b.) Difficulties of ammunition supply.

(c.) Strain on artillery material.

(d.) Bad laying and impossibility of observation with abnormal expenditure of ammunition.

Nevertheless, the ammunition expenditure appears to have kept up to the Somme standard, and even to have increased, during the spring battles in 1917, as is shown by the following table:-

Specially high expenditure of ammunition by individual batteries on individual battle days.

Type of battery.	Somme battle, 1916.	Spring battles in 1917.
Field gun (4—7 ·7-cm. guns) Light field howitzer (4—10 ·5-cm. howitzers) Heavy field howitzer (4—15-cm. howitzers) 21-cm. howitzer (3—21-cm. howitzers) 10-cm. gun (4—10-cm. guns)	Over 4,500 Over 3,000 Over 1,200 Over 750	Up to 3,450. Up to 3,100. Up to 1,600. Up to 1,200. Up to 1,175.

From this it is seen that the maximum expenditure of the heavier natures increased considerably in the 1917 spring battles, while the only decrease recorded was in 7.7-cm. field gun ammunition.

6. Ammunition reserves.—(a) Strategical allotment of ammunition and supervision of ammunition supply. (i.) The strategical allotment is controlled by a special section of the General Staff at General Headquarters: "Abteilung Op. Mun." On the Russian Front the control is delegated to a director of ammunition supply (Chef des Feldmunitionswesens beim Oberbefehlshaber Ost). On each of the remaining fronts there is an ammunition distributing centre (Munitions-Vermittlungsstelle); these are situated at Mézières, Bucharest and Uskub. At the headquarters of each Group of Armies on the Western Front there is an ammunition information officer (Munitions-Nachrichten-Offizier).

(ii.) At Group (Corps) Headquarters, a General Staff Officer, or other senior officer permanently allotted to the Group Staff, is responsible, under the Chief of the General Staff

of the Group, for ammunition supply.

(iii.) At divisional headquarters an officer attached to the staff performs similar duties. Permanent officers, assisted by technical personnel, are detailed to control the depôts in rear. On battle fronts, special staffs are formed (Park-Kommandos) to supervise work in the ammunition depots, railheads and distributing centres.

The work of ammunition columns in the Groups is supervised by permanent sector

echelon staffs (Staffelstäbe).

(b.) Stocks in battery positions. - (i.) German orders are continually laying stress on the necessity for having an adequate supply of ammunition, dumped in the zone of the batteries, during a defensive battle. This supply is not, however, all dumped in the battery position, but is widely distributed in small pits and dug-outs, in the vicinity of the battery positions and in that of the reserve and alternative positions. In practice, about one day's allotment is dumped in the battery position, and the remainder in the vicinity.

(ii.) Crown Prince Rupprecht's Group of Armies, in May, 1917, laid down the

following as the maximum totals for these small dumps:—

Light calibre, up to	0	 ••		120 rounds.
Medium, up to		 		60 ,
Heavy, up to		 	 	30 "

Shell and cartridges are kept separate as far as possible.

It is hoped by only having these small dumps to avoid heavy losses in ammunition from hostile fire, also that, when forced to change its position during battle, a battery will always find some ammunition in the vicinity of its new position.

(iii.) The following were laid down at varying dates as the amounts of ammunition considered essential to be kept in and near battery positions during a defensive battle:-

Ammunition stocks in battery positions.

Type of battery.	Report of "B" Group, First German Army, July, 1916.	Report of "A" Group, First German Army Sept., 1916.	Memorandum issued by German G.H.Q. in May, 1917.
Field gun batteries (4-7.7-cm. guns)	2,200	3,000 to 3,500	3,000
Light field howitzer batteries (4-10.5-cm. howitzers)	2,200	3,000	3,000
Heavy field howitzer batteries (4-15-cm. howitzers)		1,800*	1,500
21-cm. howitzer batteries (3-21-cm. howitzers)	450	750	900
10-cm. gun batteries (4-10-cm. guns)	1,600	••	1,800
Heavy flat-trajectory batteries		• •	200 per gun

^{*} Includes 300 gas shell.

The following points are of interest in this connection:-

The amounts laid down in May, 1917 (see table above), were considered as sufficient for three days' normal battle expenditure. (It is interesting to compare this with the actual maximum expenditure on one day during the spring battles in 1917, as shown in paragraph 5 above.)

A document issued by the Wytschaete Group in April, 1917, shows that in normal

sectors these amounts were reduced by one third.

Gas shell are generally brought up immediately before a gas-shell bombardment, and

are therefore not dumped for any length of time in battery positions.

During the Flanders battle, prisoners' statements show that the orders about dumping ammunition were disregarded owing to the difficulty of ammunition supply, and that as much as 5,000 to 6,000 rounds were sometimes dumped in or near the battery positions.

(iv.) The following table shows the theoretical and actual stocks of ammunition in the battery positions and in the divisional dump of the 192nd Division (in line in the Moreuil sector) at the end of July, 1918. The amount on charge, in each case, is an average based on the figures for 3 days:-

A .- In the battery position.

Calibre.		Number	Average number of rounds per battery.					Establish-
		batteries.	H.E.	Blue Cross.	The State of the Control of the Cont		Total.	ment per battery.
Field artillery— 7.7-cm. gun, '96 n/A. 7.7-cm. gun, '16 10.5-cm. howitzer		3	2,283 1,824 2,166	143 273 294	118 99 170	290 125 109	2,834 2,321 2,739	2,000 2,000 1,600
Foot artillery— 10-cm. gun	•••••••	1 3* 2	1,187 936 560	399 200	214 82	207 81 121	2,003 1,217 763	1,200 1,000 600

B.—In the divisional dump.

Calibre.	Average	number o	of rounds	on charge.	Establishment for dump.			
	H.E.	Blue Cross.	Green Cross.	Yellow Cross.	H.E.	Blue Cross.	Green Cross.	Yellow Cross.
Field artillery— 7.7-cm. gun, '96 n/A. 7.7-cm. gun, '16 10.5-cm. howitzer Foot artillery—	4,560 1,577 1,230	1,446 2,026 1,310	576 6,143 	471 574 50	1,500 1,500 1,200	900 900 450	900 900 450	••
10-cm. gun 15-cm. howitzer 21-cm. howitzer	1,005 390 419	639 ••	545 437 126	234 89 28	300 500 300	150 152	150 152 120	••

^{*} Of these, one battery was out at rest.

(c.) Ammunition reserves in rear.—In September, 1916, it was considered by "A" Group, First German Army, that the whole of the divisional ammunition columns should be kept filled in battle.

The following extracts are taken from a memorandum on ammunition supply, issued by German General Headquarters in May, 1917:—

(i.) It is only in exceptional cases that Groups keep ammunition reserves on rail.

(6754)

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(ii.) Groups receive their ammunition through Army Headquarters from the trains allotted to Armies by Groups of Armies; Groups of Armies make the necessary demands on General Headquarters.

(iii.) Armies and Groups of Armies must have mobile ammunition reserves (if necessary trains made up of various types of ammunition) at their disposal; this is necessary in order that ammunition can be sent up in good time, in the case of increased expenditure in any sectors. The remainder of the ammunition is stored in the lines of communication ammunition depôts.

(iv.) To meet cases in which supply by rail is not sufficient, Army Headquarters have

ammunition mechanical transport columns at their disposal,

CHAPTER IX.

ENGINEERS AND PIONEERS.

General.—Duties corresponding to those of the Royal Engineers in the British Army are divided in the German Army between-

A.—(1.) The Corps of Engineers (Ingenieur-Korps).

(2.) Fortress Construction Officers (Festungsbau-Offiziere).

-The Corps of Pioneers (Pionier-Korps).

A (1), A (2) and B are distinct corps, but all three are under the Inspector-General of the Engineer and Pioneer Corps (General-Inspektion des Ingenieur- und Pionier-Korps und der Festungen).

There is a General of the Engineer and Pioneer Corps at General Headquarters on the

Western Front.

A. -The Corps of Engineers (and Fortress Construction Officers).

The Corps of Engineers consists only of officers, who are engaged solely in the design, construction, maintenance and organization of fortresses. Engineer and pioneer officers receive the same training and are interchangeable from one service to the other.

Fortress construction officers are promoted from among qualified pioneer non-commis-

sioned officers who undergo a special course of training.

B.—The Corps of Pioneers.

1. General.—The Corps of Pioneers carries out all the work connected with field engineering, and comprises the following units:-

> Field companies. Mining companies. Bridging trains. Searchlight sections. Park companies.

The Corps of Pioneers also furnishes the personnel for trench mortar units * (see page 121) and for the manipulation of flame projectors, cloud gas and gas projectors.

A certain number of electro-technical units are also formed by pioneers for the purpose of constructing and running electric light and power stations close to the firing line. These units are generally formed locally as Corps or divisional troops and are variously

> Starkstrom-Abteilungen. Hochspannungs-Abteilungen. Elektrotechnische Abteilungen. Elektriker-Trupps.

2. Pioneer battalions.—The establishment of pioneers in peace, apart from bridging and searchlight units, was one battalion of four companies in each Army Corps, and eight battalions of fortress engineers. Attached to the Guard Pioneer Battalion was an experimental company (Pionier Versuchs-Kompagnie).

^{*} With the exception of the infantry regimental Minenwerfer companies (see page 52). (6754)

On mobilization, each of the Corps battalions was expanded by means of two Reserve companies into two battalions; the first battalion was allotted to the Active Corps, and consisted of the 1st, 2nd and 3rd Active field companies, while the second battalion was allotted to the Reserve Corps, and consisted of the 4th Active field company and the 1st and 2nd Reserve companies. The normal allotment of pioneers to a Corps was, therefore, at the beginning of the war, three companies.

Four Reserve pioneer battalions have been formed during the war, each consisting of three companies. During 1917 and 1918, 12 new pioneer battalions were formed, the 35th and 36th (formerly regiments), 37th, 38th, 44th (Saxon), 47th, 49th, 94th, 95th, 96th, 97th

and 98th.

The 35th and 36th Pioneer Battalions are specially trained in the offensive use of cloud gas and gas projectors. Each battalion is organized in 3 companies and a park A battalion normally handles 5,000 or 6,000 gas cylinders or as many as 1,000 gas projectors. Some of, and possibly all the other high-numbered battalions are similarly employed.*

The original pioneer battalions no longer exist as units in the field, though the name is

retained in the designation of the field companies.

In 1917, the pioneer units in each division were reorganized and grouped in a divisional pioneer battalion. The staffs of the original pioneer battalions were utilized to complete these units, and a number of new pioneer battalion staffs were formed.

A divisional pioneer battalion consists of :—

2 field companies. 1 searchlight section.

There is a Pioneer Staff Officer (Stopi) attached to each Group Headquarters. At each Army Headquarters there is a Pioneer General, with 1 adjutant, 1 officer for pioneer services, 1 officer for Minenwerfer services, and 1 senior officer with 3 subalterns to supervise the supply of material.

3. Pioneer regiments.—The eight fortress battalions (Königsberg, Posen, Cologne, Ehrenbreitstein, Strassburg, Metz, Mainz and Graudenz), which existed in peace, were expanded on mobilization into 10 pioneer regiments, numbered 18, 19, 20, 23, 24, 25, 29, 30, 31, and Bavarian. Each pioneer regiment consists of four to six field companies and a park company, in addition to several Reserve and Ersatz companies.

The pioneer regiments have been split up during the war and their companies allotted to different sectors as Army troops. The companies of pioneer regiments were at first employed on special technical tasks, such as mining or electrical work, while the companies

of pioneer battalions were used exclusively on field works.

In 1917, the original pioneer regiments were converted into pioneer battalions, and although the companies were in some instances allotted as field companies to divisions, the

majority of the companies were retained as Army troops.

Each pioneer regiment comprises a siege train (Belagerungstrain) and a park company. During the war, three new pioneer regiments have been formed, namely, the Guard Reserve Pioneer Regiment and the 35th and 36th Pioneer Regiments (the two last-named were subsequently converted into battalions (see above). These units are employed in manipulating flame-projectors and cloud gas.

^{*} These battalions appear to have been known as gaswerfer battalions, and are referred to as such in a German War Office letter, dated 31st August, 1918, but are officially designated as Pioneer Battalions, e.g., "Pioneer Battalion, No. 96." These battalions were under the orders of the Commander of the Gas Troops,

The Guard Reserve Pioneer Regiment consists of 3 battalions, each of 4 companies. It is specially trained for offensive operations in conjunction with the use of Flammenwerfer-The battalion is under the orders of G.H.Q., and the companies are allotted as required to Army assault battalions. The men wear Guard collar patches and, in addition, a skull and cross-bones on the left sleeve.

(a.) Flammenwerfer companies.—Flammenwerfer companies employ the Wix flameprojector, and are divided into three sections (Wix-Marschtrupp). Each section is itself sub-divided into five sub-sections (Wixtrupps), each sub-section having two flame-projectors. A sub-section comprises one non-commissioned officer, two men to carry the apparatus

(Wixträger), one man to carry the tube (Rohrführer) and one assistant.

The men are armed with the '08 revolver and sometimes with grenades, and the noncommissioned officers with carbines. Since the beginning of January, 1918, each Flammenwerfer company has been equipped with light machine guns at the rate of one gun per section, and one reserve gun per company. The flame-projector weighs 55 lbs., and the jet of flame is from 23 to 27 yards long.

(b.) The gas service.—The command of the gas service in the field is vested in the Commander of the Gas Troops (Kommandeur der Gastruppen) at General Headquarters.

This officer was formerly known as the "Inspector of Gas Regiments."

Gas questions are dealt with by the Chemical Section (A. 10) of the War Ministry, and instruction in gas warfare is centralized at the Army Gas School (Heeresgasschule) in Berlin. At Berlin-Dahlem is the Kaiser Wilhelm Institute for Physics and Electro-Chemistry, which is an experimental establishment.

In Germany there is an Anti-Gas Inspectorate (Kgl. Inspektion des Gasschutzdienstes für das Heimatgebiet), and there is a main Anti-Gas Depôt (Hauptgasschutzlager) in Berlin.

4. Pioneer field companies.—The Reserve and reconstituted divisions, formed in 1914 and 1915, were each provided with either one or two divisional pioneer companies, and this number was, in many cases, increased by the addition of Ersatz, Landwehr and Landsturm units. The new-formation divisions have all been provided with independent pioneer companies.* By the end of 1917, the number of field companies in the German Army had risen to nearly 700, so that over two companies were available for each division, instead of the three per Corps which were available on mobilization. In 1917, the number of field companies allotted to each division was finally fixed at two, the surplus field companies being allotted to Armies and Groups as required for the construction of

The establishment of a pioneer field company is—

4 officers. 1 medical officer and 1 paymaster. 262 other ranks. 20 horses.

7 vehicles.

A field company is organized in three sections (Züge), which can act independently. No bridging material is carried.

^{*} About 20 of these independent companies are known as Garrison pioneer companies, and are employed in Germany or on the L. of C.

The horses and transport drivers are provided by the Train. The transport is as follows:—

1 pioneer store wagon (Gerätewagen) (4-horsed).
3 pioneer store wagons
1 baggage wagon
1 supply wagon
1 travelling kitchen
1 pack horse

The armament and equipment of field pioneers is the same as that of the infantry (see pages 54-62), except that long-handled spades are carried instead of the small entrenching tool, and the bayonet is of a special pattern with a saw-back. The ammunition pouches are also different. (See Plate 9.) For allotment of light machine guns to pioneer companies, see page 72.

5. Mining companies.—In peace, mining was only practised by the fortress pioneer battalions, and when trench warfare commenced at the end of 1914, mining operations were usually undertaken by the Army troops companies of pioneer regiments (see paragraph 3). These companies were gradually supplemented by trained miners withdrawn from the infantry, and tunnelling companies (Berg- or Stollenbau-Kompagnien) were

improvised under divisional or regimental arrangements.

It was not until 1916 that a regular series of pioneer mining companies was created. The Prussian, Saxon and Württemberg companies (Pionier-Mineur-Kompagnien) were numbered above 200, and the Bavarian companies (Mineur-Kompagnien) from 1 to 13. By the beginning of 1918, over 50 independent mining companies had been identified. These units are more or less permanently allotted to sectors of the front, so that continuity in mining policy is obtained. Mining operations are controlled by the divisional commander of the sector in which they take place, but the engineer officer on the spot is authorized to blow mines on his own initiative when the situation requires such action. Ammonium nitrate explosives such as Perdit, Donarit, Westphalit, &c., are employed. For reasons mainly of economy, attempts are being made to generalize the employment of liquid air as an explosive, and instruction is given in its use.

In parts of the front where active mining operations are in progress, a mining group of two or three mining companies is usually allotted to a divisional sector, and placed under the orders of the pioneer battalion commander of the division holding that sector.

The establishment of a mining company is 4 officers and about 250 other ranks.

- 6. Bridging trains.—Bridging trains were formerly attached to divisions, Corps and Armies, but, at the end of 1916, they were withdrawn from lower formations and re-organized as G.H.Q. troops, being allotted to Armies as required. As the details of the new organization are not available, the old composition of bridging trains is described below.
- (a.) A divisional bridging train (Divisions-Brücken-Train) used to form part of every division. The bridging train was attached to the divisional pioneers, but the personnel and horses were all drawn from the Train.

The bridging train is organized in two sections and a reserve section.

The establishment of a divisional bridging train is—

2 officers.

59 other ranks.

98 horses.

21 vehicles.

The bridging material is carried on-

12 pontoon wagons (each carrying a half-pontoon).

2 trestle wagons.

1 shore transom wagon.

These wagons are 4-horsed.

The six pontoons of a divisional bridging train are of galvanized steel and are bipartite. The bow pieces have a raised bow to give extra safety in rough water. Both bow and stern pieces are 14 feet 9 inches long, 4 feet 7 inches wide, and 2 feet $9\frac{1}{2}$ inches deep internally. The bow piece weighs 661 lbs. and the stern piece 683 lbs. The freeboard (amidships) of the bipartite pontoon varies from 31 inches (unloaded) to $3\frac{1}{2}$ inches (with a load of $7\frac{3}{4}$ tons).

(b.) A Corps bridging train (Korps-Brücken-Train) was formerly attached to the headquarters of every Corps. It is organized in two half-columns and a reserve section, and has a pioneer detachment of 2 officers and 64 other ranks.

The establishment of a Corps bridging train is-

 $\left\{ \begin{array}{l} 2 \text{ officers} \\ 54 \text{ other ranks} \end{array} \right\}$ pioneers.

 $\left\{\begin{array}{c} 4 \text{ officers} \\ 138 \text{ other ranks} \end{array}\right\}$ train.

1 medical officer, 1 veterinary officer, 1 paymaster.

239 horses.

39 vehicles.

The bridging material is carried on—

26 pontoon wagons (each carrying 1 whole pontoon).
2 trestle wagons.

These wagons are 6-horsed, but the establishment of horses is believed to have been

reduced recently.

The 26 pontoons carried by a Corps bridging train are galvanized steel whole pontoons, $26\frac{1}{4}$ feet long, 4 feet 11 inches wide, and 2 feet $9\frac{1}{2}$ inches deep internally, weighing about 1,102 lbs. The bow and stern are similar to those of the bipartite pontoon, and their buoyancy is practically the same.

(c.) Bridging capacity.—Normal bridge is designed to take all weights up to 3.14 tons. For 21-cm. mortars, long 15-cm. guns and all vehicles weighing between 3.14 and 4.92 tons, normal bridge is strengthened by doubling the baulks under the wheel tracks. For the army mechanical transport trains (greatest weight on each back wheel of tractor, $3\frac{1}{4}$ tons) the bridge must be constructed with twice the number of pontoons required for normal bridge, the number of baulks is increased from five to nine and the chesses are doubled.

This type of heavy bridge may be used by fully loaded mechanical transport trains across rivers with a velocity not exceeding 5.1 miles an hour.

The bridging capacity of the divisional and Corps bridging trains is as follows:-

Nature of bridging train.		Bridge.	Time of	Number of	
- sours of bringing brain,	Light.	Normal.	Heavy.	construction.	pioneer companies required.
1 divisional bridging train 2 divisional bridging trains 1 Corps bridging train 1 Corps and 2 divisional bridging trains 1 Corps and 3 divisional bridging trains 1 Corps and 4 divisional bridging trains 1 Corps and 4 divisional bridging trains	909 .7	yards. 38 · 3 76 · 6 142 · 2 218 · 7 251 · 5 295 · 3	yards. 21 ·9 43 ·7 82 131 ·2 153 ·1 175	hours. -1-1 2 3 5 5 6	$ \begin{array}{c} \frac{1}{3} \cdot 1 \\ \frac{2}{3} \cdot 1 \\ 1 - 2 \\ 2 \\ 2 \\ 2 - 3 \end{array} $

The pontoon equipments can be used as rafts and flying bridges, capable of ferrying heavy guns and army mechanical transport.

7. Searchlight sections -(a.) Former organization.—On mobilization, the searchlight units consisted of one field searchlight section (Scheinwerferzug) attached to each of the 26 pioneer battalions of the Active Corps, and one fortress searchlight section with each of the 10 fortress pioneer regiments.

A number of the Reserve Corps formed during 1914 and 1915 were provided with Reserve searchlight sections, and the majority of the original fortress sections have appeared in the field, and have been replaced by newly formed heavy and light fortress searchlight

sections.

Later the Corps searchlight sections were mostly allotted to divisions.

In addition to the sections originally attached to Corps, a new series of divisional searchlight sections have been formed during the war, mainly numbered between 200

The normal establishment of a searchlight section, before the reorganization of searchlight formations in 1918, was: 2 officers, 38 other ranks, 25 horses and 7 vehicles.

(b.) New organization. In the summer of 1918, the original divisional searchlight sections were in process of being withdrawn from divisions and replaced by light searchlight sections (Handscheinwerfertrupps). Sections so withdrawn were either disbanded or became Army troops. The new sections are divisional units under the Pioneer Commander. They are not allotted, however, to all divisions, but according to require-

The establishment of a light searchlight section is:-

1 Vizefeldwebel.

2 non-commissioned officers.

17 men (including 6 drivers).

6 searchlights.

2 horses.

At the same time, the establishment of the other searchlight sections was reduced to -

1 lieutenant. 1 Vizefeldwebel. 3 non-commissioned officers. 12 men (including 2 drivers). 2 searchlights.
6 horses. 2 vehicles.

(a.) Equipment.—The technical equipment comprises—

(i.) Heavy 90-cm. electric-light projector, with motor, dynamo and scaffolding, the

whole being transported on three vehicles.

(ii.) Light 60-cm. electric-light projector, carried in trunnions on a telescopic mast mounted on a limbered wagon. The dynamo, which is carried on the limber, is driven by a 6-h.p. motor. The total weight behind the team is about 35 cwt.

(iii.) Portable searchlights, of which there are two patterns. One has an electric-light projector of 25 to 35-cm. diameter. The other, which is the more common type, has an oxy-acetylene (A.S.) projector of 25 or 30-cm. diameter. Both of these patterns can be carried on a man's back.

There is a Searchlight Depôt (Scheinwerfer-Ersatz-Bataillon) at Spandau, and an Anti-

aircraft Searchlight School (Flak-Scheinwerfer-Schule) at Hannover.

Anti-aircraft searchlight sections and batteries (Flak - Scheinwerferzüge and Flak-Scheinwerferbatterien) are attached to the anti-aircraft artillery guarding fortresses and munition factories.

- 8. Park companies.—Pioneer park companies are composed of men of the Armed Landsturm (see page 162). They are attached to Armies as required, and are employed in handling pioneer stores at the railheads and at the large pioneer depôts on the lines of communication. In all, 55 pioneer park companies have been identified.
- 9. Trench mortar units.—German trench mortar units are pioneer formations. In principle, trench mortars are served by pioneers, and trench guns by artillerymen, but in practice the personnel is largely drawn from the infantry.

The personnel of trench mortar units were formerly armed with the '98 pattern rifle, but a memorandum of the Prussian War Ministry, dated the 30th June, 1918, shows that it was then intended to replace the '98 rifle by the '98 pattern carbine.

The trench mortar organization of the German Army was changed in the summer of

(b.) The former organization was as follows:—

(i.) Each infantry battalion was provided with a Minenwerfer section, equipped with 4 light Minenwerfer. These sections were grouped in a regimental detachment (Abteilung).

(ii.) Évery division had a Minenwerfer company permanently allotted to it and forming part of the divisional pioneer battalion. These companies were numbered on the

following system:-

Each Active division had a *Minenwerfer* company bearing the same number (e.g., the 7th Division had the 7th *Minenwerfer* Company).

Each Reserve division had a Minenwerfer company bearing the same number + 200

(e.g., the 7th Reserve Division had the 207th Minenwerfer Company).

Each Landwehr division had a Minenwerfer company bearing the same number + 300 (e.g., the 7th Landwehr Division had the 307th Minenwerfer Company).

Each new formation division had a Minenwerfer company having the same number +

210 (e.g., the 221st Division had the 431st Minenwerfer Company).

A Minenwerfer company was organized in three sections, one heavy and two medium, the former armed with four heavy and the latter with eight medium Minenwerfer. Each section (Zug) was divided into sub-sections (Trupps), two for each Minenwerfer. A subsection consisted of two non-commissioned officers and four to five men. A company consisted of 8 officers, 41 non-commissioned officers and 201 men.

There were also some independent *Minenwerfer* companies, which were Army troops, and a few mountain *Minenwerfer* companies, numbered from 170 to 175, mainly employed on the Eastern Front, and provided with pack animals and vehicles suitable for mountain transport. A mountain *Minenwerfer* company is equipped with four medium and eight

light Minenwerfer.

(iii.) In addition to the divisional and mountain *Minenwerfer* companies, there existed 13 Minenwerfer battalions. These form a reserve at the disposal of General Headquarters, and are used to reinforce particular sectors.

A Minenwerfer battalion consists of-

4 companies, each equipped with six heavy and four light Minenwerfer. Draught-horse detachment (Bespannungsabteilung). Mechanical transport échelon (Kraftwagenstaffel).

Each company has a strength of about 5 officers, 180 other ranks and 50 horses.

The central *Minenwerfer* school is at Markendorf (near Jüterbog), and each *Minenwerfer* battalion has a depôt in Germany for training of personnel.

- (c.) The new organization introduced in the summer of 1918 is as follows:—
- (i.) The regimental light *Minenwerfer* detachments were converted into regimental Minenwerfer companies. These companies are organized in 3 sections (Züge), each with 3 light *Minenwerfer* and 3 anti-tank titles (to be increased to 6), and, in addition, 2 or 3 medium *Minenwerfer* in reserve. They are specially trained in anti-tank defence. The establishment of each section is 1 officer, 3 non-commissoned officers and 28 lance-corporals and men. The total establishment of a regimental *Minenwerfer* company (including company headquarters) is 6 officers and 164 other ranks (including 28 privates of the Train).
- (ii.) The divisional *Minenwerfer* companies were disbanded, and their personnel and material distributed among the regimental *Minenwerfer* companies of the division. The heavy *Minenwerfer* were sent back to a depôt.
- (iii.) The number of *Minenwerfer* battalions was increased from 13 to 23. This was done by regrouping *Minenwerfer* companies which were formerly independent, or had been sent over from divisions on the Eastern Front.

A Minenwerfer officer is attached to the headquarters of every infantry regiment. For the allotment of machine guns to Minenwerfer companies, see page 72

10. Particulars* of trench mortars ("Minenwerfer"):-

Description of Minenwerfer.	Description of shell.	Weight of shell.	Weight of H.E. charge, or gas filling.	Most favourable range.	Distinctive marking on shell.	Fuze.
Heavy "Minenwerfer." Calibre—25 cm. (9.84 in.). Weight in action—11½ cwt. †Personnel required—21 men. Rate of fire—20 rounds per hour.	Heavy H.E.	lbs. 207 ·2	lbs. 103 ·6	, yards. 219-601	Either an "E," "S," or "W" sten- cilled on the shell.	Z.s.u.m.W.M. (T. and P.)
1916 Heavy "Minenwerfer." Calibre—25 cm. (9 84 in.). Weight in action -15 cwt. †Personnel required—28 men. Rate of fire—20 rounds per hour.	1916 heavy H.E.	207 · 2	103 .6	547-984	Either an "E," "S" or "W" stencilled on the shell	With or without delay action. (P.)
Heavy "Minenwerfer."; ("Iko Flügelminenwerfer.")§ Calibre—24 cm. (9.45 in.). Weight in action—25 cwt. †Personnel required—42 men. Rate of fire—20 rounds per hour.	Heavy H.E., fitted with vanes.	220 '5	92 ·6	492-1421	See below.	Each shell is issued with 2 fuzes — one practically instantaneous, the other delay action. (P.)
1917 Pattern Heavy "Minen- werfer." ("Albrecht-Flügelminen- werfer.") Calibre—24 cm. (9.45 in.). Weight in action—31½ cwt. †Personnel required—42 men. Rate of fire—20 rounds per hour.	do.	do.	do.	492-2187	do.	

^{*} From "Die Minenwerfer," dated 5th May, 1918.
† Personnel required to carry the Minenwerfer into action.
† See 1a/43035 A., dated 16th January, 1918.
§ "Iko" = Ingenieur-Komitee.

|| Shell issued with percussion fuzes are marked eithor black or green E., R. or P. (= Krnst, Richard or Peter). Those issued with the time and percussion fuze Z.s.u.m.W.M. are marked in either black or green EA, RA or PA (= Ernst-August, Richard-August or Peter-August).

Secret 1					-	
Description of Minenwerfer.	Description of shell.	Weight of shell.	Weight of H.E. charge or gas filling.	Most favourable range.	Distinctive marking on shell.	Fuze.
1916 Medium "Minenwerfer."		lbs.	lbs.	yards.		
Calibre—17 cm. (6.69 in.). Weight in action—11 cwt.	1916 medium H.E.	109 1	26 .4	328-1258	Three black bands.	With and without delay
*Personnel required—21 men. Rate of fire—30-35 rounds per hour (H.E.). Rate of fire—40-45 rounds per hour (gas). Horse drawn—4 horses.	Medium gas.	92 ·6	22-24 · 2 (liquid).	437-1750	White bands.	action. (P.) Z.s.u.m.W.M. (T. and P.)
New Light "Minenwerfer."				-		
Calibre—7.6 cm. (2.99 in.). Weight in action—nearly 3 cwt. *Personnel required—6 men. Rate of fire—up to 20 rounds a minute for short periods.† Horse drawn. (See Plate 32 at end.)	1916 light H.E. Light gas. Light message shell.	9·9 9·9 9.9	About 1:5 (liquid).	328–1313 328–1476 325–1313	Three black bands Three white bands. l.N.M. Three black bands or "N" stencilled on shell.	l.W.M.Zdr. 2. (T. & P.) Az. 16 f.l.W.M. (P.) l.W.M.Zdr. 2. (T. and P.) l.W.M.Zdr. 2. (T. and P.)
Light "Minenwerfer" on flat trajectory carriage.			1. (i i	
Calibre—7.6 cm. (2.99 in.). Weight in action—3½ cwt. *Personnel required—10 men. Rate of fire—probably about 6 rounds a minute.	do.	do.	do.	164–1094	do.	do.
"Granat-Schnellwerfer."			07.			111
3.9 cm. rapid fire trench mortar. Calibre—3.9 cm. approximate (1.5-in.). Method of fire—searching fire in bursts of 3-6 rounds.	(H.E.	1.7 (approx.)	0z. 1.5	150-700 (at least).		Time fuze (train of powder.)
An experimental weapon	which prov	ed of littl	e value	and was	rapidly discar	ded.

^{*} Personnel required to carry the Minenwerfer into action.
† It is stated that a rate of 44 rounds per minute has been attained.
‡ A flat trajectory "mounting" (Flachbahn-Gestell) has also been provided. This mounting was designed principally for anti-tank fire in defensive warfare, but is easily portable for use in open warfare.

Description of Minenwerfer.	Description of shell.	Weight of shell.	Weight of H.E. charge or gas filling.	Most favourable range.	Distinctive marking on shell.	Fuze.
"Granatwerfer" ("stick" bomb-thrower).	a restriction	lbs.	lbs.	yards.		er kung Pulikabasi Piripawa di
Weight in action—88 lbs. Weight of thrower—53 lbs. Weight of bed-plate—35 lbs. Personnel required – 2 men.	"Stick" - bomb (pine- apple).	4	0:5	66–208		Percussion fuze.
	Signal and message rockets.			3 50.181 <u>1</u> 0 506 5 50 1.5505351		

A 17-cm. "Medium Flügelminenwerfer" has also been reported. It is said to fire an H.E. shell 123 lbs. in weight, fitted with vanes, at a range of at least 1,500 yards.

The old patterns of *Minenwerfer* have a very short gun and a rectangular bed-plate. The modern patterns have a much longer gun and are mounted on a circular bed-plate with all-round traverse.

11. Minenwerfer gas shell.

terman name for liquid filling.	Chemical implied.	Nature.	Distinctive marking.*	Calibre.
The Total Section	Xylyl bromide Mono or tri-chlormethyl chloroformate.		C (in red or white)	7 ·6 cm. 17 cm. 7 ·6 cm. 17 cm.
D-Stoff	Phosgene	Lethal	D $\left\{\begin{array}{c} \text{D} \\ \text{and three white rings} \end{array}\right.$	7 ·6 cm. 17 cm. 17 ·5 cm.† 25 cm. } 7 6 cm.

^{*} The letters B, C and D are frequently missing.

12. Gas projectors.—In reply to our gas projector bombardments, the 18-cm. (7·1-inch) smooth-bore *Minenwerfer* has been employed as a gas projector. This *Minenwerfer* is an obsolete bronze muzzle-loading trench mortar. It is mounted on a non-recoil steel carriage, which is pivoted on a rectangular steel platform. Weight in action, 9 cwt.

The normal charge consists of perforated discs of smokeless powder, but a large

charge of black powder is probably used with gas bombs.

[†] Gas projector bomb.

In 1917, the Germans introduced a smooth-bore gas projector (Gaswerfer) similar to

the Livens projector, followed by a rifled gas projector in 1918.

18-cm. smooth-bore gas projector.—The projector is of drawn steel, 114·3 cm. (45 in.) long, thickness of walls 1·2 cm. (·47 in.), bore 18·1 to 18·25 cm. (7·12 to 7·18 in.).

Close to the muzzle are two diametrically opposed holes, probably for a bar to pass through for carrying purposes. The base ends in a truncated cone with a circular threaded hole, 23 mm. ('9 in.) in diameter, which takes either a handle or the firing plug. The weight of the projector with handle is 66.2 kg. (146 lbs.).

The base plate is an adapted Livens projector base plate.

The firing fuze is similar to that used for the heavy Minenwerfer, except that the friction lighter is replaced by electrical ignition.

The propelling charge consists of 63 discs of guncotton-nitroglycerine mixture

weighing 325 grammes, similar to the charge for the medium Minenwerfer.

The igniter consists of 16 grammes of black powder.

The gas check is of millboard, 18:3 cm. (7:2 in.) diameter, pushed down the muzzle by a special clip and handle arrangement.

The muzzle cap is of millboard, painted dark green.

The bombs are of two kinds, both 18 cm. glatte Wurfmine. One is painted grey with three white bands near top, and a white "A"; fuze, Z.s.u.m. W.M.; its weight is 29.17 kg. (64.2 lbs.), and it contains 5,170 c.c. phosgene. The other is painted bluegrey, with a vertical black stripe on the shoulder. The bomb takes the Z.gl.W.M. fuze and contains H.E.

The range of this projector is 1,400 metres (1,531 yards). The projectors are dug in and arranged in parallel rows, and are sometimes fired electrically in groups of 25 in

series, the connections entering through the base.

16-cm. rifled gas projector.—The projector is of cast steel; length, 121 cm. 47.6 in.); calibre, 15.8 cm. (6.2 in.); weight, 70.5 kg. (155.4 lbs.)

Riffing: 6 grooves, each about 30 mm. × 3 mm.

The bomb is similar in shape to a 15-cm. H.E. shell, and is carried by a handle at the top. The weight is about 36 kg. (79.3 lbs.). There is no driving band, the bomb being provided with six studs of the same material as the shell; in two of these are grooves for the conduct of the electric leads.

Two kinds of bomb have been found, one containing H.E. and the other phosgene with small pumice granules, which retain some of the phosgene after the burst and give it persistence. The H.E. bomb is marked "W. Fl. 16" in black at the top, "Füll. Ham 2.7.18" in white lower down. The gas bomb has a green cross on the body and one on

The fuze is the Z s.u.m. W.M., with time rings graduated from 15 to 45 seconds. The base plate is similar to the British plate, and is 50 cm. (19.68 in.) in diameter.

The propelling charge is contained in a cartouche of cardboard material with a stuck-on lid. Diameter, 12 cm. (4.7 in.); height, 8.5 cm. (3.35 in.). An iron strip passes across the base and carries the leads.

The range as ascertained by experiment is about 2,500 metres (2,734 yards), with a

propelling charge of 450 grammes of powder.

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1. Organization and equipment.—The development of tanks as a weapon in the German Army is in a very backward stage. Although, during 1917 and the early months of 1918, various reports were received as to the construction of tanks by the Germans, none were identified in the field until the 24th April, 1918, when a tank belonging to the 1st Tank Detachment was captured at Villers-Bretonneux.

A War Ministry Order, dated the 7th July, 1918, showed that the creation of 19 tank detachments was contemplated, numbered from 1 to 7 and from 11 to 22, inclusive. The

majority of these, however, have not been identified in the field.

The strength of the German tank detachments in the field appears to be:-

1st—3rd Tank Detachments 15 German tanks. 30 captured tanks. 11th—16th Tank Detachments

It was proposed to increase this strength, as captured tanks became available, as follows:-

17th—22nd Tank Detachments 30 captured tanks.

The 1st-3rd Tank Detachments (Sturm-Panzer-Kraftwagen-Abteilungen) each consist of 5 German tanks (Geschütz-Panzer-Kraftwagen (A 7 V-Wagen)). The detachments numbered from 11 upwards consist of 5 captured tanks (Beutetanks), 2 male (Geschütz-) and 3 female (M.G.-Panzer-Kraftwagen).

2. Establishment of a tank detachment.—The detachment commander (a captain) and 4 lieutenants each command one tank. In addition, each odd-numbered detachment has a machine gun officer and each even-numbered detachment has a field artillery officer, making, in either case, a total of 6 officers in the detachment.

The remaining personnel for a tank detachment is as follows:—

a da in in a d	ustelli :	l rode a	oi bunta	German tank.	Captured tank.
Driving personnel Machine gunners Field artillerymen Signallers Medical corporal Privates of the Train	ari tz uman		E 1 3 · RODIE · · · · · · · · · · · · · · · · · · ·	81 other ranks. 48 " 22 " 12 " 1 " 6 "	81 other ranks. 20 " 14 " 12 " 1 " 6 "
	Total	•	ri di omabi. Colona 1961:	170 other ranks.	134 other ranks.

3. Crew of a German tank.—The crew of a German (A 7 V) tank is 1 officer and 15 other ranks, composed as follows:—

(tank commander). 1 captain or lieutenant (signaller). 1 Vizewachtmeister (first driver). 1 corporal .. (second driver and mechanic). 2 lance-corporals 2 corporals ... (machine-gun commanders). 2 lance-corporals (machine gunners). 4 privates ... (gun commander). 1 corpora! (layers). 2 lance-corporals

- 4. Depôt and Training.—A new training ground (Geländefahrschule) was being prepared at Brunswick in July, 1918, and, as soon as this was ready, the depôt was to be the 10th M.T. Depôt Detachment (Kraftfahr-Ersatzahteilung) (X Corps District), instead of the 1st M.T. Depôt Detachment (Guard Corps Depôt). The personnel for the tanks was to be assembled at the 10th M.T. Depôt Detachment, and sent to an assault battalion, to be selected by the Chief of the General Staff of the Field Army, for training as assault troops.
- 5. Description of German tank.—The German tank "Elfriede," the first to be captured, can be described (see Plates 33 to 35 at end) as an armoured "caterpillar," carrying a 6-pr. gun and six machine guns. It can travel across ordinary country (cornfields, roots, &c.) as fast as a trotting horse, but can neither cross an 8-foot trench nor climb a 4-foot bank. It is useless on anything like rough ground, and is then practically obliged to move along the roads. Its only advantage over the ordinary British heavy tank lies in its rapidity of movement over firm and unbroken ground; otherwise it is an inferior weapon.

Parts of the tank.—The framework, on which is built up the armour-plated body.

The two tracks or "caterpillar" belts, below the framework, one on either side of the tank.

The two engines, placed side by side in the centre of the framework and covered in by light plating. In front and behind the engines are the radiators and the oil tanks. There are two petrol tanks, between the tracks, in front of the forward radiator. From

each engine runs a driving shaft to the large gear case in front of the rear axle.

The body, divided into a front and a rear compartment connected by passage ways on either side of the engines. The floor is continuous throughout. In the roof, two louvres are provided for the purpose of ventilation. These consist of three layers of steel slats,

spaced so as to admit a current of air.

The cab, or O.P., which projects 2 feet above the roof of the tank.

Over-all dimensions.—Length, 24 feet; width, 10 feet 6 inches; height, 11 feet.

Weight. — 40 tons approximately.

Speed.—Maximum speed on level ground for a short distance, 8 to 10 m.p.h. (say 1 mile in 6—7 minutes).

Armour.—Front of tank, $1\frac{3}{16}$ inch; sides, $\frac{5}{8}$ -inch; rear, $\frac{13}{16}$ -inch. Front of cab, $\frac{13}{16}$ -inch;

sides and rear, $\frac{5}{8}$ -inch. Loophole covers, $\frac{1}{1}\frac{3}{6}$ -inch.

Armament.—One 5.7-cm. (6-pr.) Q.F. gun, on pivot mounting, firing through a loophole in the front of the tank and protected by a shield.

Six heavy ('08 pattern) machine guns, on shielded pivot mountings, firing through loop-

holes two on either side of the tank and two in rear.

Four rifles are carried in a rack in rear of the radiator,

Ammunition.—The gun fires three kinds of ammunition:—

(a.) Armour-piercing H.E. shell with delay action fuze.

(b.) Ordinary H.E. shell with delay action fuze.

(c.) Case shot.

Engines. —Two 100 h.p. Daimler 4-cylinder engines of German manufacture. Electric self-starters.

Drive.—One man control; each engine drives one track. There are two clutches, one change speed lever, two brake levers and two reverse levers; three speeds forward and three reverse, each track being driven independently. The tank is steered by turning the steering wheel in the direction required. This throttles down the engine on the required side.

For sharp turns, if the turn should be to the right, the right clutch is disengaged and the right hand track brake applied.

There is an arrangement in the gear case by which one track can be put into forward and the other in reverse, but it is very doubtful if this would ever be required for steering

Observation.—Exceptionally bad. Neither driver nor officer can see the ground within ten yards of the front of the tank. The gun and machine guns can be trained on a point about five yards away from the tank.

6. Vulnerable points of German tank (see Plates 33 and 34).—In front.—The gun shield, the observation loopholes on either side of the gun and the two observation loopholes in the cab.

On the side.—The two machine gun loopholes and the observation loophole in the cab. In rear.—The two machine gun loopholes and the two observation loopholes in the cab:

(All the above loopholes (14 in number) measure $8\frac{1}{2}$ inches by $13\frac{3}{4}$ inches).

Underneath.—The tank is not armoured underneath. The floor is of soft steel \(\frac{1}{4}\)-inch thick, and there is no flooring under the engine.

The roof.—Immediately in front of and behind the cab, where the plating is only $\frac{5}{16}$

inch thick.

Effect of bullets.—The gun shield and all the loopholes are vulnerable against the "splash" of ordinary bullets, that is to say, fragments of bullets splash through the joints of the shields and flaps and wound the crew.

It is known that, during the Villers-Bretonneux attack, our machine gun and rifle fire wounded some of the German machine gunners. Owing to the "splash," they were

obliged to keep their heads down and consequently fired wildly.

Effect of artillery.—A direct hit will put the tank out of action, and the crew may be wounded by splinters from shell bursting close to the tank.

7. Anti-tank defence.—(a.) Active defence.—The following weapons were employed by the Germans for anti-tank defence:—

(1.) Ordinary 7.7-cm. field gun (see page 82).

(2.) 7.7-cm. field gun mounted on a recoil carriage on low wheels. (3.) 7.62-cm. infantry gun (see page 107).

(4.) 5.7-cm. gun.

(5.) 5-cm. Q.F. gun (see page 107).(6.) 3.7 cm. gun (see page 107).

(6754)

(7.) Tankzug auf Kraftwagen (? Tankjäger) were being organized at the end of 1918.

(8.) Light Minenwerfer, particularly the light Minenwerfer on flat trajectory carriage (see page 124).

(9.) Ordinary machine guns ('08, '08-'15, '08-'18 patterns, using armour-piercing ammunition (see pages 69-73).

(10.) Anti-tank machine gun (see page 73).

(11.) Anti-tank rifle (see page 56).

(12.) Concentrated charges. The German infantry were always instructed to engage tanks with concentrated charges (geballte Ladungen). These consisted of a bundle of hand grenades of the "stick" type. It was laid down that these were to be thrown underneath the tank.

(b.) Passive defence.—For passive defence against tanks, the following artificial obstacles were recommended in an order issued by the Seventeenth German Army, dated 21.9.18:-

Barricades of ferro-concrete and rails.

Heavy wagons ready to be pulled across a road on receipt of a tank alarm.

Harrows, agricultural machines, wire rope and a tangle of wire and chain which would get into the machinery of the tank.

Ditches at least 13 feet wide and $6\frac{1}{2}$ feet deep, with steep sides.

Bridges prepared as tank traps by weakening the structure.

Tank mines; of these the principal types were various types of box mines, buried Minenwerfer shell, fortress electrical contact mines, "wire fence" mines. The general principle in all these mines was that the weight of a tank exploded the mine after the safety arrangements had been removed.

In addition, there were "chains of mines," consisting of charges in boxes, connected together, which were to be drawn across the road as the tank approached, and observation mines to be fired electrically. The last were recommended for covering the approaches to bridges, which, for tactical reasons, it was not desired to destroy. Careful camouflage was considered important, and the use of dummy mines of value.

CHAPTER X1,

SIGNAL SERVICE.

1. Peace organization.—In peace the personnel of the Signal Service was found by the Telegraph Troops (Telegraphentruppen), consisting of :-

6 Prussian telegraph battalions and 7 fortress telephone companies.

1 Saxon telegraph battalion and 1 fortress telephone company. 1 Württemberg telegraph company and 1 fortress telephone detachment.

2 Bavarian telegraph battalions.

The officers were drawn mostly from the engineers and pioneers, some from the infantry and railway troops. The uniform of the Telegraph Troops was similar to that worn

by the pioneers, but a shako was worn, and the shoulder straps bore a "T."

In January, 1917, the Telegraph Troops were separated from the Communication Troops, to which they formerly belonged, and were organized as a separate corps under the Director of Signals (Chef der Feldtelegraphie), who also controlled the telegraph and

2. Present organization and command.—In July, 1917, the Signal Service (Nachrichtenwesen) was completely reorganized and extended to embrace all means of communication, including telegraphs, telephones, power buzzers, listening sets, wireless telegraphy, visual and sound signalling, message-carrying projectiles, carrier pigeons and messenger dogs. The name Telegraphentruppen was changed to Nachrichtentruppen, and the Director of Signals (Chef des Nachrichtenwesens) was made directly subordinate to the Chief of the General Staff of the Field Army, being his adviser in all matters dealing with signals,

as well as being the executive head of the Signal Service.

In each of the main theatres of war there is a G.O.C., Signal Service (Nachrichten-General), and there is a Signal Commander (Nachrichten-Kommandeur) at the headquarters of each Army, Corps and division, and also with each fortress in Germany. A Prussian War Ministry order, issued in October, 1917, ordered the amalgamation of the staff of the Army Telephone and Army Wireless Commanders (Akofern and Akofunk) into one staff, viz., that of the Army Signal Commander (Akonach). Similar staffs at Group Head-quarters are combined under the Group Signal Commander (Grukonach). In a division, all means of communication are under the direction of the Divisional Signal Commander (Divkonach). A Signal Service Adviser (Nachrichtenreferent) is attached to the headquarters of a Group of Armies. In trench warfare, Permanent Signal Officers are allotted to

The organization of the Signal Service in an Army is, therefore, as follows:-

Army Signal Commander.

2 Army telephone detachments.

1 Army wireless detachment.

1 Army signal park.

Corps (Group)-

Group Signal Commander.

1 Group telephone detachment.

1 Group wireless detachment. Listening sets,

(6754)

Division-

Divisional Signal Commander.

1 divisional telephone detachment.

1 divisional wireless detachment (with power buzzer apparatus).

Each cavalry division is provided with a cavalry signal detachment.

Each Army Corps District in Germany has a Signal Depôt (Nachrichten-Ersatz-Abteilung), which is responsible for the supply and training of all personnel for the Signal Service. Each Army in the field has also a Signal School (Nachrichtenschule), usually with a Wireless School attached, where the training is completed, and an Army Signal Park for the supply of material.

3. Regimental signalling detachments —A regimental signalling detachment (Regiments-Nachrichtenabteilung) is allotted to every infantry and artillery unit. It is subordinate to the Divisional Signal Commander (Divkonach) in technical matters. A regimental signalling detachment normally comprises 1 officer and 130-140 men,* drawn from the telephone and lamp signalling sections (Fernsprechzüge and Blinkerzüge), which are sector troops. It provides the requisite personnel for carrier pigeons, messenger dogs, message projectors, &c. The personnel of regimental signalling detachments wear the letter "N" in red on the sleeve of their tunics.

4. Telegraphy.—Telegraph units are not allotted to formations in advance of Army

A Lines of Communication Telegraph Directorate (Etappen-Telegraphen-Direktion) connects the headquarters of each Army with neighbouring Armies, Corps, Groups of Armies and General Headquarters. The instruments used are the Siemens high-speed telegraph (Schnelltelegraph), with a speed of 24,000 to 30,000 words an hour, the Hughes' telewriter (Fernschreiber), and the ordinary sounder (Klopfer). The first two systems deliver the messages ready printed.

5. Telephone units.—At each Army Headquarters there are two Army Telephone Detachments (Armee-Fernsprechabteilungen), numbered in two series, e.g., the Fourth Army has the 4th and 104th Army Telephone Detachments. Each of these units comprises a headquarters section (Stationszug) and 5 to 7 motor airline sections (Kraftwagen-Fernsprech-Bauzüge). The strength of a section (Bauzug) is :-

1 officer. 7 non-commissioned officers. 35 other ranks.

4 motor lorries.

These sections are numbered in a series commencing with 900.

Each Army in the field has an Army Telephone Park for the supply of material. The officer commanding the telephone units at Army Headquarters is known as the Armee-Fernsprechkommandeur (Akofern). He works directly under the Nachrichtenkommandeur at Army Headquarters.

A telephone detachment is allotted to each Group (Corps) and Divisional Headquarters. These detachments are numbered in series according to the formation to which they are

attached, as follows:-Active and high-numbered divisions

Divisional number (e.g., 11th with 11th Division).

^{* 83} telephone operators, 33 signallers, 7 pigeon experts and 10 men for the messenger dog service.

Reserve divisions			400 + divisional number (e.g., 424th with
Landwehr divisions	n.		24th Reserve Division).
Ersatz divisions			13th Landwehr Division).
	 ••	••	550 + divisional number (e.g., 554th with 4th Ersatz Division).
Active Corps		••	600 + Corps number (e.g., 607th with VII Corps).
Reserve Corps			700 + Corps number (e.g., 712th with XII Reserve Corps).

The telephone commander at Corps Headquarters is known as Kofern or Kofe.

Special telephone detachments are attached to cavalry divisions, fortresses, and units

engaged in mountain warfare.

During trench warfare, the Group (Corps) telephone detachment lays the requisite number of lines to divisional headquarters (including counter-attack divisions). The divisional telephone detachment connects divisional headquarters with brigades and regiments.

A telephone detachment consists of several sections, each carrying 25 miles of cable, which can be laid at the rate of about 1,000 yards in half-an-hour. In addition to air-line, two kinds of cable are employed: Armeekabel, which has a covering of woven yarn only, and Feldkabel, which is insulated with rubber.

There are also Fortress Telephone Detachments (Festungs-Fernsprechabteilungen).

6. Earth current telegraphy.—German listening sets are named after the engineer, Arendt, who designed them. An Arendt detachment (Ara) is attached to the Headquarters of each Army, and comprises about 15 officers and 300 other ranks. The Arendt detachment consists of a number of Arendt groups (Agru), one for each Group (Corps) in the Army. An Arendt group comprises several listening sets (Abhörstationen or Astos), one or two for each divisional sector. The personnel* of each listening set consists of 10 to 20 noncommissioned officers and men. Each divisional sector is also provided with a mobile policing set to check German teledhone conversations. These listening sets are attached to the divisional telephone detachment.

Power buzzer stations (Erdtelegraphenstationen), each consisting of a sending and receiving apparatus, are alloted to divisions in active sectors at the rate of 2 per infantry regiment. The personnel required for each station is 1 non-commissioned officer and 4 men, these being provided by the regimental signalling detachments (see paragraph 3 above).

The average range of a power buzzer with amplifier is about 2,200 yards.

7. Wireless telegraphy.—Wireless stations are allotted to all formations down to divisions, and are fixed or mobile as required, or adapted for use with aircraft or in mountain warfare. Intercepting and compass stations are also allotted for detecting the enemy's wireless traffic. At each Army Headquarters there is an Army Wireless Detachment (Armee-Funkerabteilung) with 2 heavy wireless stations (range nearly 200 miles), 2 compass stations and 1 intercepting station. An Army Wireless Park is allotted to each Army for the supply of material. The wireless troops at Army Headquarters are under the orders of the Armee-Funkerkommandeur (Akofunk), who works directly under the Nachrichtenkommandeur.

^{*} Commanders, either officers or vizefeldwebels, are always interpreters. Interpreters, usually noncommissioned officers, are obtained from the School for Interpreters at Berlin.

Each Group (Corps) Headquarters has a Group Wireless Station) Gruppen-Funkerabteilung or Grufunka), with a range of about 60 miles, and 1 compass station. The Group

Wireless Commander is known as Gekofunk.

A Prussian War Ministry order of the 30th May, 1917, shows that the aeroplane jamming stations (Fliegerstörer), which were formerly attached to Corps Headquarters, have become Group Wireless Stations (Gruppen-Funkenstationen). These are numbered in a series from 500 upwards. The same order shows that the heavy field wireless stations, intercepting stations and compass sections (Richt-Empfang-Trupps), which were formerly attached to Army Headquarters, but were numbered independently, have now been absorbed into the Army Wireless Detachment (Armee-Funkerabteilung). This means that the wireless organization has been simplified by amalgamating the previously existing independent wireless formations into centralized units at Army and Corps Headquarters.

A divisional wireless detachment (Divisions-Funkerabteilung or Divfunka*) was formerly allotted to each divisional sector on active sectors of the front. It formed part of the

sector troops. A divisional wireless detachment consists of :-

1 divisional wireless station.
1 infantry wireless station (2 large, 5 medium and 6 small sets).
1 artillery wireless section (2 large, 6 medium and 4 small sets).

All portable sets.

The ranges of these sets are as follows:-

 Divisional station
 ...
 ...
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 ...
 ...
 4,400 - 6,600 yards.

 Large trench set
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Now, every division has a *Divfunka* allotted to it, forming part of the divisional troops and moving with the division from one sector to another. A *Divfunka* consists

of 2 or 3 officers and about 80 men.

In addition to the above, every Army area contains a number of aviation fighting stations and aerodrome stations, according to the number of aviation units in the area. In active sectors, special wireless stations are allotted to heavy guns on railway mountings, working directly under Army and Corps Headquarters. Communication with aeroplanes is maintained by the wireless stations allotted to Armies, Corps, divisions and artillery groups.

Each cavalry division has a cavalry wireless detachment, with 1 heavy and 2 light

stations. The respective ranges are 190 and 62 miles.

There are also Fortress Wireless Detachments (Festungs-Funkerabteilungen), both fixed

and mobile, the former in Germany itself and the latter in occupied territory.

8. Lamp signalling.—Extensive use of lamp signalling (Blinken) is made by the Germans in the forward areas during trench warfare. The personnel required for a lamp signalling station is 1 non-commissioned officer and 4-6 signallers.

A Prussian War Ministry order of the 16th March, 1918, gives the reorganization of

former signalling squads (Signaltrupps) into lamp-signalling sections (Blinkerzüge).

Each new lamp-signalling section was formed by amalgamating four of the former signalling squads. The new lamp-signalling sections were numbered consecutively from 2 to 58, 101 to 107, 109 to 112, and 1730, a total of 69 sections, including seven mountain sections.

These lamp-signalling sections are at the disposal of the Higher Command, and are

^{*} Formerly known as Funker-Kleinabteilung (Fukla).

administered by the Divkonach in their allotted sectors (see paragraph 3 above). Their establishment is as follows:—

	Officers.	N.C.O.s	Н	Pres.	Vehi	cles.
#250 The Company of	Omcers.	and men.	Riding.	Draught.	2-horsed.	Bicycle.
Lieutenant and bâtman Vizefeldwebel (acting serjeant-major) Corporals	1 ··· ·· ··	1 1 4	1 1 		 	••
1 man, supply duties 5 lance-corporals and 1 cyclist 26 privates.	••	31	••	8	4	1
Total	1	37	2	8	4	1

Establishment of a mountain lamp-signalling section (Gebirgsblinkerzug):—

	1			Но	rses.		
	Officers.	N.C.O.s and men.	Piding		Draught.		Vehicles (2-horsed).
		10 10 10 10 10 10 10 10 10 10 10 10 10 1	Riding.	Lead.	Wheel.	Pack.	
Lieutenant (commander)	1	1	1				
Vizefeldwebel (acting serjeant-major)		1	1	/••	••	• •	•••
Corporals	::	9	-	••	••	••	••
32 lamp signallers)				•	••	••	••
8 telegraphists							
1 mechanic } 9 lance-corporals 1 man, supply duties and 41 privates. 8 drivers, including 1		5 0		••		••	••
shoeing-smith. 17 privates of the Train, including 16 drivers for pack animals.	••	17	••	••	•	•	
8 signalling lamps 4 large '16 pattern.	••	••	•••	••	••		••
8 signalling lamps a pattern. 4 medium '16 pattern.	••	••	••	••	• n	8	• • •
12 infantry telephones (Fernsnrechaeräte)	157 (156)	T. (1)				0	
4 two-horsed baggage carts			••	4	 4	8	••
Spare			••		• • •	8	4
Commence of the commence of th							• •
Total	1	77	2	4	4	24	4
The state of the second section of the section of the second section of the second section of the second section of the section of the second section of the				8	34 34		

The 1916 pattern apparatus (Blinkgerät 16) is actuated by dry batteries. It is easily portable and can be carried on horseback or on a bicycle. It is issued in three sizes:—

Large sig	nalling	lamp	 	 	range abou	it 6,600 y	yards.
Medium	·,,	,,	••		37	3,300	,,
Small			 	 .,	"	900	,,

The 1917 pattern lamp is used for communicating with aircraft and observation balloons.

The following table shows the allotment of 1916 pattern signalling lamps to the various staffs and units:—

				Large.	Medium.	Small.
Divisional Headquarters	••		•••	4	4	••
Infantry Brigade Headquarters	• •		••		2	•• 55
Infantry Regimental Headquarters .	••				4 , ,	••
Infantry Battalion					6	2
Machine Gun Company					4	
Regimental Minenwerfer Company					2	2
Divisional Artillery Staff					2	
Field Artillery Regimental Headquarters					6	
Field Artillery Abteilung					10	
Foot Artillery Regimental Headquarters					4	
DILLIN DILL IT 1					4	
Foot Artillery Battery		••			4	
	••	•••	••		2	
	••	••	• •	••	4	11
Minenwerfer Battalion Headquarters	••		•••	••	4	• 1
Minenwerfer Company of a Minenwerfer	r Batta	lion	••		4	••
					10,2019,000	1

9. Message-carrying projectiles.—The Germans have recently introduced message-carrying projectiles to transmit written messages from front to rear.

A message rocket (*Meldewurfgranate*) is used from the front line to battalion headquarters, and from forward observing officers to artillery command posts. It is projected either by means of the 1916 pattern "stick" bomb-thrower, or by a special "signalthrower" to a range of 550 or 650 yards.

The signal-thrower (Signalwerfer) consists essentially of a rifle mechanism contained in a hollow steel rod, shod with a spike for planting in the ground. The rocket is made with a hollow shaft to slip over the rod of the signal-thrower, which contains the striker. The propellant charge and percussion cap are contained in the body of the rocket.

The signal-thrower is primarily intended for projecting light-signals, but can also be used for projecting message rockets. It is issued to all regimental staffs and units down to companies and batteries.

The light message shell (*leichte Nachrichtenmine*) is used between battalion, regimental and brigade headquarters, and as a means of communication between infantry and artillery. It is fired from the light *Minenwerfer*, the range being 1,313 yards.

A smoke-indicator cartridge (*Rauchmeldepatrone*), fired from a signalling pistol, is used by airmen for dropping written messages.

A machine gun indicator flare is also fired by the signal-thrower to a maximum range of 450-550 yards, a special clinometer being issued for obtaining the required elevation. This flare is fired at machine gun nests in order to indicate their location to the artillery, whence its name, M.G. Zeiger-Granat-Signal or machine gun indicator flare. On impact it emits a large puff of smoke.

10. Carrier pigeons.—In each Army, the carrier pigeon service is controlled by the Army Signal Commander. Normally each Corps has a training loft (Korpsschlag); homing lofts (Heimatschläge), which are frequently mobile, are stationed near divisional headquarters.

Pigeon lofts are either mobile or stationary, with a personnel consisting of 1

superintendent in charge of the loft, 1 assistant and 3 attendants.

Each divisional sector has 4 mobile lofts (1 or 2 for the artillery).

Each Group Headquarters has 3 mobile lofts (also for counter-attack divisions and aviation troops).

Each Army Headquarters has 2-4 lofts (for back lines).

Stationary lofts contain about 200 birds, and mobile lofts about 150 birds. Pigeon lofts are army troops, and remain permanently in the sector to which they are allotted.

Pigeon stations (Abflugstellen) are maintained at all headquarters which employ pigeons, at infantry and artillery command posts, and with forward observing officers and infantry company commanders. They comprise 3 pigeon men each.

A carrier pigeon officer is attached as technical adviser to each army signal commander. The lofts are usually numbered consecutively throughout each Army. In some cases, the pigeons used by an Army are dyed a distinctive colour, as in the case of the Sixth Army, where the birds are generally dyed red.

11. Messenger dogs.—A messenger dog section (Meldehund-Trupp) is attached to each Army Headquarters.* This unit acts as a training school where dogs and attendants are trained, and issued to Corps and divisions as required. The Army messenger dog sections train dogs received from Germany, instruct the attendants and complete the training of dogs sent back from the front for further training.

The section is under a lieutenant, who is also in charge of the carrier pigeon service. The personnel consists of 1 *Vizefeldwebel*, 5 non-commissioned officers, 2 or 3 lance-corporals,

52 men in charge of the dogs, and 9 cooks, orderlies, &c.

Messenger dogs are allotted to the infantry signalling detachments (see page 132); a maximum of 12 dogs may be allotted to a regiment and 6 to a battalion. Each dog requires an attendant and an assistant attendant. These men are detailed by regiments or battalions and sent to the Army messenger dog section for a four weeks' course of training,

after which they return to their units with trained dogs.

The messenger dog's attendant carries a box containing a gas mask for his dog, either slung over his shoulder or hooked to his belt. The mask consists of a pointed nose-bag, which is secured over the dog's head by a broad fur-lined collar-band, in which there are holes for the dog's ears. This collar fastens on the dog's neck with a hook and eye, and under his throat with a strap and buckle tapes. The eye-pieces are similar to those of the men's masks, and are either of glass or mica. The mask can be put on over the dog's collar, should there be no time to remove the latter. It is stated that the material (not

^{*} There are Mel'ehunde-Schulen at the disposal of G.H.Q. There are also Meldehunde-Staffeln in the Various Army Signal Parks.

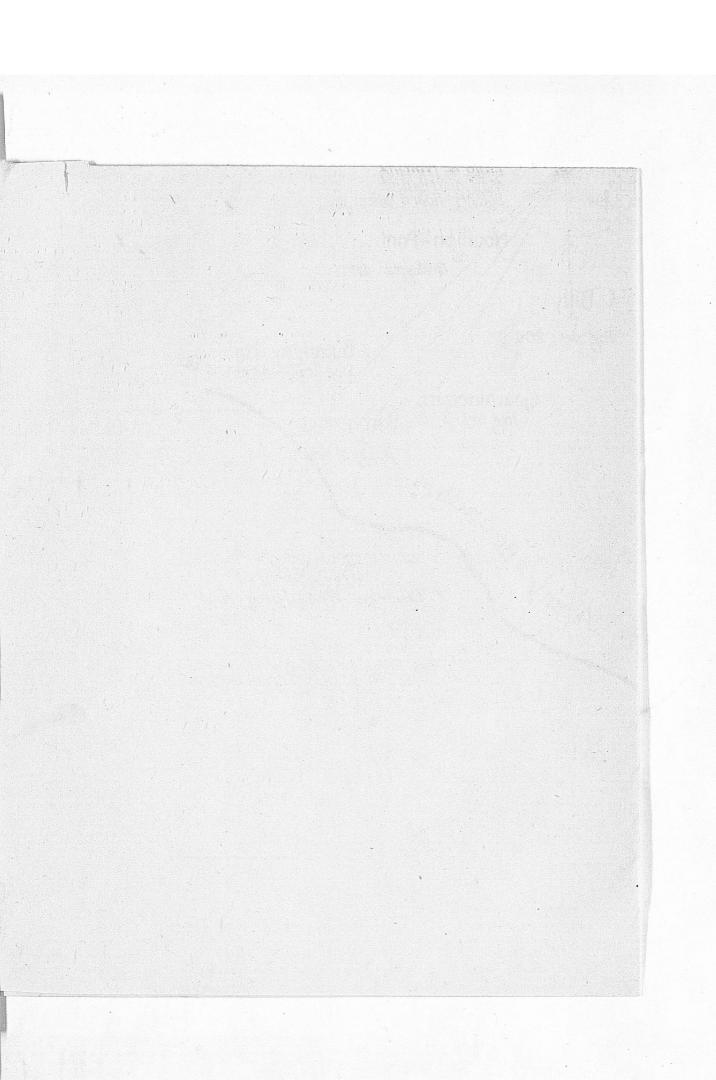
leather) of which this mask is made is impregrated with a particular solution, and when

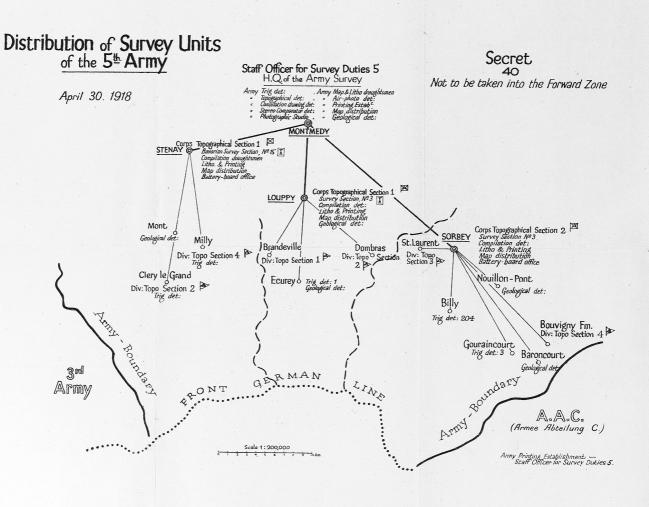
dry should be moistened with water.

The dogs principally employed are of the German sheep-dog or wolf-hound breed. Messages are carried in a cylindrical tin case, about 6 inches long and $1\frac{1}{2}$ inches in diameter, attached to the collar. The average time to carry a message between battalion and company headquarters (about a mile) is from 6 to 8 minutes.

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CHAPTER XII.

SURVEY.

1. Survey department.—In peace, the Prussian Survey (Landesaufnahme) was placed directly under the control of the Great General Staff. The survey was divided into three sections—trigonometrical, topographical and cartographical.

In war, the Landesaufnahme is under the Acting General Staff in Berlin, and is

organized as follows:-

Cartographical section. Trigonometrical section. Topographical section. Photogrammetric section. Geological section. Scientific computation office. Map room.

Central directorate of surveys.

The subordinate personnel of the survey was in peace mainly civilian. The officers and non-commissioned officers employed on survey work are especially drawn from the artillery.

2. Organization in the field.—In war, the whole of the survey is placed under

the Director of Military Survey (Chef des Kriegsvermessungswesens) at General Headquarters.

At the Headquarters of each Army in the field there is a Survey Staff Officer (Stabsoffizier des Vermessungswesens or Stoverm), and one or two Survey Detachments (Vermessungs-Abteilungen), which correspond to our Field Survey Companies. Each survey detachment has a map-printing section (Karten-Felddruckerei) attached, and is responsible for trigonometrical and topographical work, the preparation of artillery maps and boards, and the supply and issue of maps.* Some Armies, e.g., Second, Fifth and Sixth, have two survey detachments, but the majority have only one; 29 of these units have been identified. On the Lines of Communication of each Army in the field there is a map depôt (Kartenlager).

Each Corps and divisional headquarters comprises a topographical section (Kartenstelle), where trench maps can be overprinted and sketch-maps and plans can be drawn and reproduced. The personnel consists of an officer or survey official and a staff of qualified draughtsmen. These divisional and Corps topographical sections are actually branches of

the Army Survey Detachment.

There is a General Staff Officer for Maps at the headquarters of each Corps.

Corps topographical sections are provided, wherever possible, with a lithographic power

3. Duties of survey detachments.—The survey detachment at the Headquarters of an Army in the field is responsible for all trigonometrical and cartographical work required by the Army, as well as for the exploitation of aeroplane photographs. The following account of the duties of these units is compiled from the instructions on the subject issued by the Sixth German Army.

^{*} There were a number of printing trains, and it is stated that each Vermessungs-Abteilung had one Personnel, 1 officer and about 45 men.

The following data must be sent direct by units to the survey detachment or Corps topographical section :-

(a.) All reconnaissance reports, photographs, sketches, &c., concerning changes in the position of hostile batteries, defences, trenches, &c.

(b.) Flash intersections obtained by the observation groups.

(c.) Two copies of every aeroplane photograph, numbered and annotated.

The following work also devolves on the survey detachment:-

(a.) Checking the triangulation network in the Army area, triangulating new trigonometrical points, erection of bench-marks.

(b.) Topographical reconnaissance in order to correct existing maps; partial re-surveys

where necessary.

(c.) Preparation of barrage maps and battery boards for field and heavy artillery, observation groups, &c. Trigonometrically fixing battery aiming points, observation posts and battery positions.

(d.) Location of important points in the foreground by triangulation, plane-table and

photogrammetric methods.

(e.) Re-section of sound-ranging posts and observation group posts

(f.) Stereo-photogrammetric panoramas.

(g.) Geological research. Assistance to the mining units and advice on questions

affected by the condition of the ground.

(h.) Reproduction of maps, enlargements and reductions, &c. When this work becomes too large to be dealt with in sufficient time, it is passed to the Cartographical Section of the General Staff in Berlin, or the Topographical Boreau in Munich.

(i.) Inspection of captured maps, cadastral and mining plans, and utilization of the

information obtained from these.

(j.) Printing of maps, plans, sketches, orders and forms. Mounting maps and binding pamphlets.

(k.) Photography and photogrammetry for technical and historical purposes.

(l.) Preparation of relief maps in plaster or cardboard layers.

4. Survey units working with artillery.—The location of active hostile batteries is largely carried out by an elaborate chain of artillery survey units, viz.:-

Observation groups (Licht-Messtrupps, formerly called Artillerie-Messtrupps.) Sound-ranging sections (Schall-Messtrupps).

These units count as artillery formations and wear artillery uniform; at least one officer in each must be an artillery officer. They are placed at the disposal of Armies, which allot them as required to Corps and divisions. The observation groups and soundranging sections are sector units and remain in their sectors when the formation to which they are allotted is relieved; they are, however, placed directly under the orders of the artillery commander of the division holding their sector. One observation group and one sound-ranging section are normally allotted to each divisional sector. The front covered by the posts of one of these units varies between 3 and 10 miles.

At the end of 1918, 177 observation groups and about 150 sound-ranging sections had

been identified.*

^{*} The final organization seems to have been an Artillerie-Messtrupp, comprising a Licht-Messtrupp, a Schall-Messtrupp and a Mess-Zentrale. The last was probably the headquarters of the Artillerie-Messtrupp and corresponded to the British Compilation Section.

There is a school of instruction (Artillerie-Messschule) for the personnel of observation

groups at Wahn (Germany).

There exists also a series of giant periscope (Mastfernrohr) detachments, which are attached to artillery groups. The detachment consists of one non-commissioned officer and four men.

5. Organization and functions of artillery survey units. Each observation group has four or five flash-spotting posts (Licht-Messstellen), and each sound-ranging section has four or five sound-ranging posts (Schall-Messstellen). If required, each unit can man six posts. Each of these units has a separate telephone system linking it up to a headquarters office (Auswertungs-Stelle) where the results are computed. These headquarters are situated together if possible, and conveniently near the divisional artillery headquarters. Transport and telephonic communication are provided by the divisional artillery headquarters. The strength of an observation group or sound-ranging section is four or five officers and about 100 men.

The information obtained by the above units is communicated direct to the artillery, and is then sent for accurate compilation to the Army Survey Detachments, which are

responsible for the compilation and publication of maps.

The observation groups and sound-ranging sections not only locate hostile gun positions, but also range their own batteries. They work in close co-operation with the artillery intelligence officer, and with the divisional topographical section (Kartenstelle).

The following are the duties of artillery survey units according to the training manual

issued in May, 1917:-

(a.) Location of hostile batteries and other targets.

(b.) Information from aeroplane photographs.
(c.) Observation of fire for their own artillery.
(d.) Observation of the enemy's movements.
(e.) Preparation and use of stereo-photographs.

(f.) Preparation of charts and tables showing the positions, number and activity of hostile batteries.

(g.) Preparation of artillery boards for their own use.

(h.) Collection and collation of all reconnaissance reports concerning the sector.

6. Maps.—In peace the normal scales used were 1/100,000 for ordinary manœuvres,

and 1/25,000 for detailed operations.

The small scale maps used by the Germans in the field are mainly 1/200,000 and 1/300,000 scales. An edition of the 1/200,000 is published for aviators, without contours, and with information as to camps, billets, &c., printed in red.

Of medium scales, there is a 1/60,000 reduction of the Belgian 1/40,000, and a direct reproduction of the French 1/80,000. Neither of these gives any information which is not on the originals, except that town and village populations are shown on the 1/80,000.

French army plans directeurs have been copied, and sometimes combined with enlarge-

ments from smaller scale maps.

On the Western Front the Germans use the 1/80,000 for general purposes, and the 1/25,000 as the normal trench map. Trench maps on scales of 1/10,000 and 1/5,000 are also issued.

Trench maps are squared with a kilometre grid, the squares being sometimes identified horizontally by letters and, vertically, by numbers, but more usually numbered on a system of geographical co-ordinates. The kilometre square is usually sub-divided into 25 secondary squares.

7. **Meteorological stations.**—There is a meteorological station (*Feldwetter-Station* or *Feldwetterwarte**) at the Headquarters of each Army in the field; each of these has a number of forward stations (*Frontwetterwarten*) which send in observations for the daily weather forecasts. Weather reports are issued twice daily.

The meteorological stations work in conjunction with the divisional anti-gas officers

and with aircraft units.

The Army Meteorological Station is placed under the orders of the aviation

commander at Army Headquarters.

Each Army Meteorological Station has also a number of wind observation posts (Windwarten), one of which is normally situated a mile or so behind the front in each Corps

area, and is manned by two men.

In each divisional sector there is a collecting station for forward observations (Gassammelstelle) under the control of the divisional gas officer. It collects the weather reports sent in by the weather observation posts in the forward areas. There is normally one of these posts, consisting of three men, in each regimental sector.

8. Meteorological Service for the Artillery.—The field kite meteorological stations (Felddrachenwarten) and the Army and advanced meteorological stations (Armee-

und Front-Wetterwarten) undertake the service for the artillery.

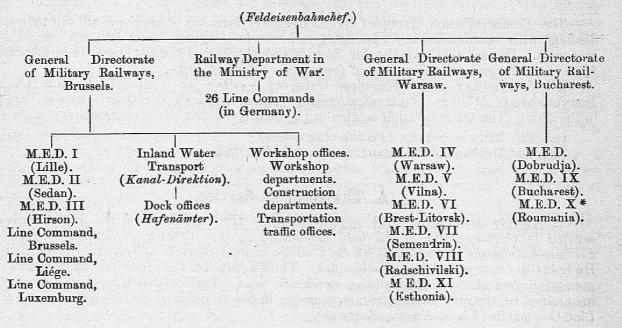
The field kite meteorological stations, one being allotted to two Armies on the Western front, ascertain by means of captive kites and balloons the state of the air in the higher strata. About six observations are made daily. On account of the danger to which aeroplanes are exposed by the work of these stations, the kite and balloon beds are situated a long way behind the front—on the Western front over 30 miles from the front line. They are subordinate to the Army Meteorological Station in whose area they are employed. Their employment is effected by the direct orders of the Commander of the Air Forces.

The advanced meteorological stations make observations at ground level and record anemometer readings at high levels, and in addition to their duties in respect of the Air Forces and the gas meteorological service, are responsible for working out their own observations and those furnished them by the Army Meteorological Station in accordance with the requirements of the artillery, and pass them to the batteries. They are stationed at the headquarters of all corps and of divisions in line, where they remain permanently. For artillery and tactical purposes they are under their corps headquarters or their divisional artillery commander, but for all other purposes they are under the Army Meteorological Station. Observations are made and reports thereon supplied to the batteries every four hours.

There is a staff officer for the artillery meteorological service under the Inspector-General of Schools of Gunnery. He is stationed at Charleville. His duties are to see that the fullest use is made of this service, to maintain personal touch with the higher staffs, artillery formations and meteorological units and to make proposals for the improvement of the service. He reports to the Inspector-General of Schools of Gunnery.

German Railway Organization.

DIRECTOR OF RAILWAYS AT GENERAL HEADQUARTERS.



MILITARY RAILWAY DIRECTORATE
(Militär-Eisenbahn-Direktion)
or

LINE COMMAND (Linien-Kommandantur).

Locomotive offices (Maschinenämter).

Operating traffic offices (Betriebsämter).

Transportation traffic offices (Verkehrsämter).

Independent Traffic and Constructional Units.

^{*} There is also a F.E.D.X. (Feld-Eisenbahn-Direktion) at Bildjik, about 30 miles east of Broussa Asia Minor).

CHAPTER XIII.

TRANSPORTATION.

The Communication Troops (*Verkehrstruppen*) formerly comprised all the personnel dealing with communications, including air service, signals, railways and mechanical transport. During the war the Air Service and the Signal Service have been separated from the Communication Troops and organized as distinct corps.

All the railway and mechanical transport services are controlled by the General Inspectorate of Military Communications in Germany, and by the Quartermaster-General

in the field. The transportation service in the field is divided into two branches:—

(a.) The Railway Service (Feldeisenbahnwesen).

(b.) The Mechanical Transport Service (Feldkraftfahrwesen).

A. The Railway Service.

- 1. Higher command and organization.—The command of the entire railway service in Germany and in the field is centred in the Director of Railways (Chef des Feldeisenbahnwesens or Feldeisenbahnchef), whose central office is at General Headquarters. He holds the rank of a Corps commander. The diagram on the preceding page shows the general organization of the railway service in war. Traffic on the lines in Germany is maintained by the civil administration, working under 26 military control offices known as Line Commands (Linien-Kommandanturen).
- 2. General directorate.—As shown in the diagram, the executive control in each of the main theatres of war is exercised by a General Directorate (*Militär-General-Direktion* or *M.G.D.*).

The General Directorate at Brussels has supreme control of all railways in the occupied portions of France and Belgium. It has a large staff, divided into the following

8 branches :-

Military,
Interior economy,
Finance,
Construction,
Transportation traffic,
Locomotive,
Operating traffic,
Medical.

The General Directorate at Brussels administers the railway system through the medium of three "military railway directorates" at Lille, Sedan and Hirson, and three "line commands" at Brussels, Liége and Luxemburg. The administrative zones of each of these offices is shown by Plate 12.

Also under the direct control of the General Directorate at Brussels are the Director of Inland Water Transport (Kanal-Direktion), miscellaneous workshops and construction

organizations, and certain transportation traffic offices (Verkehrsämter).

- 3. Railway representatives with armies.—A railway representative (Bahnbeauftragter or Bba) is attached to the headquarters of each Army and Army L. of C. area on the Western Front. This officer is a representative of the General Directorate at Brussels, and is directly under the orders of that office, being independent of the military railway directorates. All requirements of the military authorities as regards troop movements, and transportation by rail or canal, are submitted to him for transmission to the railway and canal services. The railway representative also controls the constructional alterations to the railway and canal systems (including light railways and trench tramways) in the zone of the formation to which he is appointed.
- 4. Military railway directorates and line commands.—The military railway directorates (Militär-Eisenbahn-Direktionen or M.E.D.), of which there are three on the Western Front—at Lille, Sedan and Hirson—administer large zones, as shown by the map on Plate 12. Their staff, like that of the General Directorate, is divided into 8 branches, with somewhat similar functions.

As shown in the diagram, each military railway directorate administers a number of locomotive offices (*Maschinenämter*), operating traffic offices (*Betriebsämter*), and transportation traffic offices (*Verkehrsämter*). The directorates also control a number of

independent construction and traffic units (Bau- and Betriebs-Kompagnien).

There are three line commands, at Brussels, Liége and Luxemburg, controlling the zones in Belgium and Luxemburg, adjacent to Germany (see Plate 12). The above remarks regarding the staff and the sub-offices and units controlled by the military railway directorates apply also to the line commands.

5. Locomotive offices.—Under the control of each military railway directorate and line command are two or more locomotive offices (*Maschinenämter*). Eighteen of these are known to exist on the Western Front, and seven on the Eastern Front.

Within their zones of control these offices are responsible for all mechanical questions, including the control of repair shops, the maintenance, disinfection and marking of rolling

stock and the distribution of locomotives.

In the zone of each office and under its control there are three or four local repair shops, known as *Betriebswerkmeistereien*, situated at large stations, such as Meirelbeke. Bruges, Courtrai and Valenciennes.

The locomotive offices also control the mechanical personnel at all stations in their

zone on technical matters.

6. Operating traffic offices.—Under the control of each military railway directorate and line command are a number (6 or 7) of operating traffic offices (*Betriebsämter*). About 40 of these are known to exist on the Western Front, and about 20 have been identified on the Eastern Front.

Within their zones of control these offices are responsible for the running of timetables, the signal arrangements, the speed and precedence of trains, and the use and

disuse of stations.

These offices control the personnel of their branch at all stations in their zone.

7. Transportation traffic offices.—Under the administration of each military railway directorate and line command are two or three transportation traffic offices (Verkehrsämter). Fifteen of these have been identified on the Western Front. Certain of these offices are directly under the orders of the General Directorate, Brussels.

These offices differ from operating traffic offices in that they do not operate traffic, but deal with transportation in their areas, with the issue of tickets and passes, the control of (6754)

traffic to other countries, the customs and freight regulations, the nomenclature of stations and the distribution and use of rolling stock.

In departmental matters, these offices control the personnel of all statious in their

zones.

8. Railway personnel.—The railway troops (Eisenbahntruppen) consisted in peace of:—

3 Prussian railway regiments, each of 8 companies.

1 Prussian railway battalion of 4 companies.
1 Bavarian railway battalion of 3 companies.

3 railway traffic companies, working the military railway from Berlin to Jüterbog.

The railway personnel is now organized in:-

(a.) Railway construction companies (Eisenbahn-Bau-Kompagnien). These include, at least, 80 Active, 60 Reserve, 6 Landwehr and 15 Fortress construction companies.

(b.) Railway traffic companies (Eisenbahn-Betriebs-Kompagnien). These include 100 Active and 7 Fortress traffic companies and, in addition, about 50 light

railway traffic companies, numbered from 101 and 201 upwards.

There are also 5 railway workmen battalions, 9 supplementary battalions and 23 railway store companies.

At least 13 armoured trains (Panzerzüge) are known to exist.

Each railway construction and traffic company is affiliated to the depôt of the railway regiment from which it was formed, and wears the number of that regiment on the shoulder straps in Roman numerals under the "E" which distinguishes the railway troops.

Railway troops wear the Guard Litzen on collar and cuffs.

At the beginning of 1918, all German railway troops were given the title of "Railway Pioneers" (Eisenbahn-Pioniere).

9. System of traffic control.—Early in the war, no railway time-tables existed in the occupied portions of France and Belgium. Trains started for a destination, getting through as best they could, passing from station to station as the line became clear.

In 1915, the "marche" system was introduced on the lines of the system in Germany, calculated for a mean speed of 30 km. per hour. This system has been in use ever since.

When the "marche" system was introduced, time-tables formulated from it came into operation. These schedules show the running of all regular express, passenger, leave, supply and goods trains. During troop movements, where such are protracted, the troop trains are interposed between trains on the existing time-tables, causing no change to the running of the regular trains beyond certain delays. During continuous and large troop movements, whole series of trains, especially of the less important natures, are cut out of the programme.

New time-tables for the Western Theatre of war appear to be issued frequently, necessitated possibly by the ever-changing restrictions imposed on traffic of different

variatios

Normally, time-tables are punctually adhered to. A feature of certain time-tables is the fact that through wagon-lit accommodation was provided, until lately, between between places such as—

Thielt and Cologne, Douai and Strassburg, Vouziers and Saarbrücken, &c. The "block" system of signals appears to be universally employed. Pre-war sections have not been materially altered. A certain percentage of German appliances have been introduced.

10. Speed and tonnage of trains.—Captured time-tables show that 95 per cent. of goods trains keep to the basic speed of 30 km. per hour. In isolated instances they travel at 40 km. per hour; on a few local lines 15 and 20 km. per hour are laid down.

As regards the faster passenger and leave traffic, in 1915 some of this ran at 80 km. per hour, which was soon afterwards reduced to 70. More recent information shows that fast trains do not now reach a speed greater than 50 to 60 km. per hour. In April, 1917, the maximum speed for Belgian engines was laid down as between 45 and 60 km. per hour.

The maximum tonnage carried on a truck lies between 12 and 15 tons. The tonnage carried on a goods train varies from 270 to 650 tons; in the majority of cases between 500 and 650 tons. For the purpose of engine haulage, tables have been drawn up which show the tonnage to be drawn on any particular stretch of line for every type of locomotive in use.

No train is allowed to exceed 110 axles in length.

11. Control of troop movements.—Orders for the movement of divisions are issued from the central railway office at German General Headquarters. The movement of

smaller formations is arranged by the local railway authorities.

When a big troop movement is about to take place on the Western Front, the General Directorate at Brussels receives instructions from German General Headquarters as to the time of commencement and completion. Provided these instructions are complied with, the control of the movement within the zone of the Brussels authorities is entirely left to those authorities. The movement, including the entraining and detraining arrangements, is then regulated from Brussels. In the case of formations entraining on the Western Front, as soon as the order for the movement is received from German General Headquarters, instructions are issued by the Brussels authorities to the most favourably situated centres of rolling stock to make up a definite number of fixed pattern trains, to be sent to certain points by a certain time.

12. Arrangements for troop movements.—Experience has shown that the number of trains required to move a German division with its field artillery from one portion of a theatre of war to another portion of the same theatre is 40 to 45.* The number required, however, to move a division from one theatre to a different theatre is very much larger, varying from 60 to 80. The extra trains in the latter case are accounted for partially by the fact that the longer journey necessitates the provision of more liberal accommodation for men and horses, and partially by the fact that heavy artillery also often accompanies formations in inter-theatre movements.

Experience also shows that the number of wagons on troop trains for constituted units lies between the limits of 40 and 60. There is, however, to a certain extent a standard in troop trains in that, for each type of unit, a train is made up of a fixed proportion of the different types of wagon. Such trains are kept ready made up at various forming-up

stations.

(6754)

^{*} During 1918 it was found that German divisions—owing no doubt to the depletion of their effectives—were using only about 30 trains for moves from one part of the Western Front to another.

The minimum interval allowed between trains on a clear line is 20 minutes. In practice trains are run at intervals varying from 20 to 40 minutes when necessary. The speed with which troop movements can be carried out, therefore, is usually dependent on the entraining and detraining arrangements. No fixed number of entraining and detraining points is laid down. Roughly, however, it takes the trains carrying a German division 4 days to pass a point when travelling between parts of any one theatre, and 6 to 8 days when travelling from one theatre to another. Entraining and detraining apparently requires to be spread over these periods in the case of a divisional movement. The average time taken to transport a single unit from the Western to the Eastern Theatre is 106 hours. From East to West the average time is 127 hours, the additional time being taken up by the disinfection of the troops on reaching the German frontier at special disinfecting stations (Entlausungs-Anstalten).

13. Breakdown arrangements.—Detailed arrangements exist for dealing with breakdowns. Breakdown trains are stationed at fixed intervals. Each carriage has allotted to it certain stretches of line, on which it will deal with all breakdowns. Breakdown trains only move when wired for, and are then given priority on all lines. The following list shows the position of the 19 carriages in the zone of the Military Railway Directorate at Lille (M.E.D.I):—

Ghent (St. Pierre), Ostend, Orchies, Somain, Ledeberg, Courtrai, Ath, St. Ghislain, Meirelbeke (two), Lille (three), Tourcoing, Cambrai, Bruges, Tournai, Valenciennes (two).

14. Light railway construction.—Light railway (Feldbahn) construction has only

been carried out in the zone of operations within 20 miles of the front.

Within this zone a complete network has been built up, based on the pre-war metre gauge system. On quiet fronts, the enemy has usually aimed at two lines of supply, either metre or normal gauge, per division in line. To these lines of supply have been added many transverse lines and branches to points of importance.

A feature of the light railway construction since midsummer, 1917, has been the tendency of the enemy to break bulk farther from the front. The transfer points of freight from normal to narrow gauge have been established at places averaging 16 miles

from the front, as compared with a previous average of 5 to 6 miles.

It is of interest to note that the 60 cm. gauge system has not been adopted by the enemy to any extent, most of the light railway system being metre gauge. The 60 cm. gauge is only employed in the very forward areas, and usually in the form of trench tramways.

B. The Mechanical Transport Service.

1. General organization.—In peace, the mechanical transport and the air service were jointly under the control of the Inspector of Military Aircraft and Mechanical Transport Services, but these services have been completely separated during the war, and the mechanical transport troops (Kraftfahrtruppen) were reorganized in December, 1916, and have now a separate inspectorate (Inspektion des Kraftfahrwesens), under the Inspector-General of Military Communications.

The command in the field is exercised by the Director of Mechanical Transport (Chef des Feldkraftfahrwesens or Feldkraftfahrchef), who holds the rank of a brigade commander, and is directly under the orders of the Quartermaster-General. The Director of Mechanical Transport controls all mechanical transport services in Germany, on the lines of communication and in the field. He also has the General Headquarters Mechanical Transport Park

directly under his orders.

The uniform of the mechanical transport troops is similar to that of the railway troops, except that the letter "K" is worn on the shoulder straps instead of "E." Car drivers and motor cyclists wear a bronze collar-badge representing a car or motor cycle.

The shortage of rubber and petrol has considerably restricted the employment of mechanical transport by the Germans during the war. As a rule, it is employed only where

the railway service is either insufficient or overstrained.

2. Organization in the field.—At the headquarters of each Army in the field there is a Commander of the Mechanical Transport Troops (Kommandeur der Kraftfahrtruppen or K. d. K.) holding the rank of an independent battalion commander, with a staft of 5 officers and 27 other ranks. Each Army has a mechanical transport park (Armee-Kraftwagenpark), a pool of cars and lorries (Kraftwagen-Staffel), a motor cyclist detachment (Kraftradfahrer-Abteilung), a postal lorry park (Post-Kraftwagen-Park), a motor ambulance convoy (Sanitäts-Kraftwagenabteilung), and an Army artillery tractor park (Armee-Fussartillerie-Kraftzug-Park).

3. Mechanical transport columns.—Attached to each Army is a varying number of lorry columns (Armee-Kraftwagenkolonnen, or A.K.K.). At the Lines of Communication Main Depôt of each Army in the field there is a mechanical transport park (Etappen-Kraftwagenpark), with a varying number of Lines of Communication mechanical transport columns (Etappen-Kraftwagen-Kolonnen).

Earlier in the war mechanical transport columns were allotted to Corps, but in 1916 these were split up and converted into divisional units. A Divisional Mechanical Transport Column (*Divisions-Kraftwagen-Kolonne*, or *D.K.K.*), consisting of from 6 to 12 lorries, is allotted permanently to each division. These units are numbered in regular series as

follows :-

500 and	d upwards		with units in Palestine and Syria.	
530	,,	٠.	" Prussian, Saxon and Württemberg Active divisions.	
680	,,		" Bavarian Active divisions.	
700	,,	• •	" Prussian, Saxon and Württemberg Reserve divisions	5.
750	77		" Bavarian Reserve divisions.	
760	,,		" Ersatz divisions.	
770	raterio.		" Landwehr divisions.	

A captured order, dated the 21st June, 1918, shows that Army field artillery regiments were being equipped with motor transport to facilitate their rapid transfer independently of the railways. Thus the 93rd Field Artillery Regiment had attached to it the 101st Lorry Park (Kraftwagen-Staffel) consisting of headquarters and three sections. Each section is intended for the conveyance of a field artillery Abteilung, and consists of 35 lorries, in addition to the necessary motor vehicles for personnel.

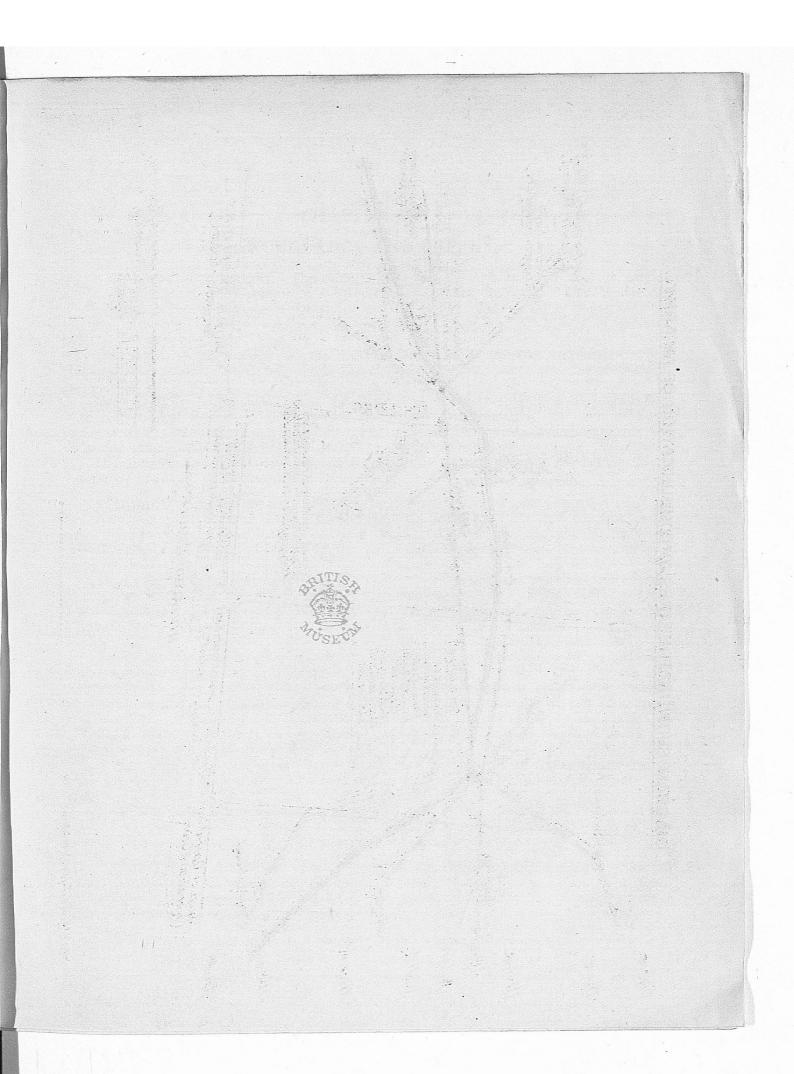
- 4. Caterpillar columns.—Caterpillar columns (Raupenkolonnen) consist of vehicles known as Tankautos ("lice"). They are used for the transport of artillery ammunition and for general haulage purposes (see page 110).
- 5. Motor lorries on rails.—Convoys of motor ammunition and supply lorries are run on the normal gauge railway lines, the lorries being fitted with flanged wheels.
- 6. March route.—A secret order issued by German General Headquarters, and dated 31st March, 1918, lays down the following road spaces for units on the march. The table was based on the strengths of the best equipped divisions at that time:—

150

Road spaces.

Unit.	Including 1st Line transport.	Baggage section of the Train.
	yards.	yards.
I.—Infantry—	570	145
Battalion, with Machine Gun Company	1,870	495
Staffs.		
Machine Gun Marksman Detachment	495	100
II.—Cavalry—		
Squadron	110	55
III.—Artillery-		20
Field Artillery Battery	240	66
" " Abteilung	770	220
Light Ammunition Column	385	55
Heavy Field Howitzer Battery	330	75
21-cm. Howitzer Battery	385	75
Battery Ammunition Column	275	45
IV.—Minenwerfer—		•
Minenwerfer Company	385	75
VPioneer Battalion (Headquarters, 4 companies, Mechanical	1,870	22 0
Transport Column and Draught Horse Detachment.		A STATE OF THE STATE OF
Pioneer Company	165	35
Divisional Bridging Train (with teams)	330	55
Corps Bridging Train	825	75
VI.—Medical units—	Programme Comment	
Bearer Company	275	
TA* 11 TT * 1 1 1 .	220	
Veterinary Hospital	440	
VII.—Columns and trains—	**	1
Ammunition Column	660	>,
Supply Column and Park	660	
Field Bakery Column	550	1

Note.—Signal troops, mechanical transport troops, and air force units are not included because they do not generally march in close column of route with mixed formations.



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CHAPTER XIV.

INTENDANCE AND SUPPLY.

1. General organization.—The supply of the German Armies in the field is carried out mainly through the agency of a semi-civilian branch known as the Intendance (Intendantur). The Intendance is controlled by the Army Administration Department of the War Ministry (see page 40), and the personnel is composed principally of military officials (see page 43).

The entire supply service of the German Army is under the Intenandt-General (General-Intendant des Feldheeres), who is directly subordinate to the Quartermaster-General

(see page 47).

Each Army in the field has its own *Intendant*, and similarly there is a *Korps-Intendant* with each Corps Headquarters to control the supply arrangements. At each divisional headquarters there is a *Feldintendantur*, or administrative staff, which controls the divisional supply office (*Feld-Proviantant*).

In Germany, the administrative work in each Army Corps District is carried out by a

"deputy-intendant" (stellvertretender Intendant).

2. Organization in the field.—The Army Intendant has to ensure supplies reaching the troops and the resources of the country being utilized to the full; he is responsible for money contributions, and for magazines being established and filled. He is under the direct orders of the Chief of Staff of the Army, but under the Intendant-General for administration and accounts.

The Corps Intendant is responsible for the supply of his Corps, whether it is derived from local sources or from the Lines of Communication. He is responsible for the administration of all supply units in his Corps, such as supply columns and parks, field bakeries, &c. Under him are the field Intendance and field pay, supply and bakery offices.

At the headquarters of each infantry regiment there is a transport officer (Bagage-Führer), who is responsible for the regimental transport, and in each battalion there is a supply officer (Verpflegungs-Offizier), who is responsible for drawing and issuing rations. These officers carry out the arrangements made by the Feldintendantur as regards supply and transport.

Each infantry battalion has a paymaster (Zahlmeister), who is responsible to the

Feldintendantur as regards the pay of the unit.

A Main Depôt (Etappen-Haupt-Ort) is established in the Lines of Communication area of each Army in the field, usually at a central railway junction, e.g., Ghent, Ath, Maubeuge, Hirson.

Each Corps and divisional headquarters has a field supply office (Feld-Proviant Amt), situated at the Corps or divisional railhead (Ausgabestelle), and draws its supplies and ammunition direct from the Lines of Communication Main Depôt of its Army.

3. The Train.—All the personnel of medical and supply units, except the trained medical, veterinary and mechanical transport personnel, is found by the *Train*. The *Train* corresponds to our Army Service Corps only in so far as it provides the personnel, horses and vehicles of transport and supply units.*

^{*} The Train also provides personnel, horses and vehicles for regimental transport, bridging trains, &c.

Ammunition, supply, transport and bakery columns, as well as bridging trains, originally formed part of the divisional and Corps trains. These units were grouped in echelons (Staffeln), two to each division and one to each Corps. Each echelon had a permanent staff (Staffelstab), which supervised the working of the columns. An echelon

staff consisted of 5 officers and 15 other ranks.

Owing to the difficulty involved in moving so many administrative units when divisions and Corps were relieved, the supply service was completely reorganized at the beginning of 1916. The use of mechanical transport was largely extended, a number of Army M.T. columns being allotted to each Army, and one divisional M.T. column being allotted to each division. Army M.T. columns are allotted temporarily to Corps staffs as required. The divisional M.T. column is now the only transport unit which forms part of the divisional organization and moves with its division.

4. Echelon staffs.—All the horsed ammunition, transport and supply columns are now sector units, which are grouped under echelon staffs and allotted permanently to areas, at the rate of one echelon staff to each divisional sector and one to each Corps Headquarters. An echelon staff allotted to a divisional sector normally administers:-

2 light artillery ammunition columns (l. Mun. Kol.).

2 new pattern artillery ammunition columns (Mun. Kol. n/A.).

1 supply column (Proviant-Kolonne). 1 supply park (Fuhrpark-Kolonne).

1 field bakery column (Feldbäckerei-Kolonne). 1 divisional bridging train (Div.-Brücken-Train).

The echelon staffs attached to Corps Headquarters are similarly constituted, and each usually administers in addition a field hospital, a veterinary hospital and a field butchery. The echelon staffs, and the train units which they administer, are now largely employed in exploiting the economic and agricultural resources of the occupied territories, and in administering to the civilian population in the forward zone. Each inhabited village forms an Ortskommandantur, administered by a town major (Ortskommandant), who is usually an officer temporarily appointed from one of the echelon staffs. Under the orders of the echelon staffs are placed the cart-horse columns (Landespferdekolonnen), works companies (Wirtschaftskompagnien) and harvesting companies (Erntekompagnien) which may be allotted from time to time for agricultural purposes.

In addition to Corps and divisional train echelons, the Train forms a number of supply

and transport units on the Lines of Communication, namely :-

Depôt supply parks (Magazin-Fuhrpark-Kolonnen).

Lines of Communication supply parks (Etappen-Fuhrpark-Kolonnen). Lines of Communication auxiliary bakeries (Etappen-Hilfsbäckerei-Kolonnen).

Lines of Communication medical depôts (Etappen-Sanitäts-Depots). Lines of Communication remount depôts (Etappen-Pferde-Depots).

The Feldintendanturen of divisions and Corps draw their supplies direct from these Lines of Communication depôts during trench warfare.

5. Depôt supply parks.—The depôt supply parks (Magazin-Fuhrpark-Kolonnen) of the German Army constitute part of the Lines of Communication Train. They are under the orders of the Kommandeur der Etappentrains, who is himself directly under the orders of the Army Etappen-Inspektion.

Magazin-Fuhrpark-Kolonnen are auxiliary parks provided by the Kriegs-Etappen-Ordnung for special duties, such as the establishment of dumps intermediate between the Lines of Communication dumps and those of the front line, for the temporary reinforcement of the Lines of Communication supply parks, &c.

Examination of prisoners has shown that the parks still perform these functions to some extent, but on the Eastern Front they also appear to be employed on the agricultural

and forestry work in occupied territory.

In accordance with the establishment laid down by the Kriegs-Etappen-Ordnung, each park is allotted 60 lorries, and the personnel is provided by the Feldtrain-Kompagnien.

Magazin-Fuhrpark - Kolonnen constitute a single series, including Bavarian, Saxon and Württemberg parks. The series is numbered from 1 upwards, the highest number identified being 917. It is certain, however, that many gaps exist in the series, owing to the fact that a number of parks, for which the scheme in its entirety provided, were never formed, and also because many of those numbered from 1-100 have been renumbered in the series over 400.

It may be assumed that the minimum number of Magazin-Fuhrpark-Kolonnen in existence is about 200. Most of them are attached to the Etappen-Inspektionen, though a

few have been attached, at least temporarily, to Corps or divisions.

6. Rations.—(a.) Rations carried.—The supplies carried with the troops consist of the field service ration (Kriegsportion) and the iron ration (eiserner Bestand). The numbers carried and their composition according to the peace establishment are shown in the following tables:-

	1		On the man or horse.			In supply columns
		Iron ration.	Iron ration.	Field service ration.	Iron ration.	and parks.
Cavalry— Rations Forage Infantry— Rations Forage Horse Artillery— Rations Forage Forage Forage Forage Field Artillery— Rations Forage Forage		1 1 2 1 1½ 2	3† 3§ 3 1½ 3 2	2* 1½‡ 2* 2 2* 3 2* 3¶		Five days' rations and three days forage for Corp. and half cavalry division.
Forage Pioneers—		2	2	1 10 (iii.i 122-1		1
T	• ••	.1	3	2*		Haran Baga

Cut down to one day's rations after the first day's march. Three days' extra groceries are also carried ‡ Two days' for officers' horses only.

+ For draught horses. § For riding horses on the horse and for draught horses in the wagon.

[¶] For the officers' horses only. | For the wagon horses only.

(b.) Composition of rations prior to the war.—At the beginning of the war the composition of the iron ration and field service ration was as follows:—

Forage ra	tion.	-	5½ lbs.	Hay.			os. (6 kg		•	aw. (1 ·5 kg.
Gr toor g	7/10 6	oz. sug oz. salt	ar.	••	••	•••	•	25 25	"	
Grocery	$\int_{1/10}^{9/10} d$	oz. coff oz. tea	ee <i>or</i> 	••	•••	••	•••	$\begin{array}{c} 25 \\ 3 \\ 20 \end{array}$	"	±, y(0,2),
	1 4 04.	ed ratio	egetable on of pot	atoes	and drie	ed veget	tables	600	_91 91	*
	$\int 53$ oz.	potato	es or			•		1,500 60		
THE YEAR IS			red meat regetabl		untida 1		125	200 -250	13 (1 11
Meat	∫ 13 oz.	fresh	or froze		t or			375	, , , , , , , , , , , , , , , , , , , 	
Bread	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	egg b z. field	iscuit <i>or</i> biscuit	• • •	••	• •	••	500	"	
	∫26½ oz	z. bread		••		••		†700 400	grammes	
Field servic								11.		
Normal Heavy dr	aught h	orses	••	••		2	$6\frac{1}{2}$ lbs	. (12	kg.) oats.	
Iron forage	ration	<u>. 10</u>				1	3 1 lbs	s. (6 l	g.) oats.	
						12 11 (1)				
26.4								750	,,,	
3 · 5 oz. pa				••	4 T. J	••	••	100	"	
•9 oz. co •9 oz. sa		• •	••		• •			25	• • • • • • • • • • • • • • • • • • • •	
5.3 oz. pr	eserved	vegeta	bles	••	••	16.	• •	$\begin{array}{c} 150 \\ 25 \end{array}$	3 7	
8.8 oz. bi 7.0 oz. pr		·· meat*	• •				1.	200	grammes.	

Iron ration.— 8.82 oz. biscuit	. 250 grammes 200 ,,	2 carried by each man and 1 in the travelling kitchen.
15·87 oz.	450	

^{*} Or 6 oz. bacon.

Iron forage ration—(maximum scale).—

```
oats, barley, \begin{cases} 14.35 \text{ lbs.} (6.5 \text{ kg.}). \\ 11.02 , (5.0 , ). \end{cases}
maize, \begin{cases} 6.61 & (3.0 & ) \\ 3.30 & (1.5 & ) \end{cases}
Or a proportion of substitutes (cake, fodder, molasses, potatoes, &c.).
```

Field service ration.—

Meat ration.—The daily fresh meat ration has undergone a considerable reduction, namely, from 350 g. (12.34 oz.) in December, 1915, to 288 g. (10.16 oz.) at the end of June, 1916. According to a statement laid before the Reichstag in October, 1916, the fresh meat ration at that time had been still further reduced, viz., to 250 g. (8.82 oz.). Further, one meatless day per week was introduced in June, 1916.

These conditions were still in force in September, 1918, i.e., the ration for 6 days in the week was 250 g. (8.82 oz.), the average daily ration being, therefore, approximately 210 g.

(7.40 oz.) per head.

The preserved meat ration was reduced during the same period from 200 g. (7.05 oz.) to 150 g. (5·29 oz.).

Bread ration.—The normal daily ration issued to the fighting troops in September, 1918, was 700 g. (1 lb. 8.68 oz.) for men between the ages of 21 and 42. Men below and above these ages, under medical recommendation, may receive the old ration of 750 g. (1 lb. 10·45 oz.).

Vegetable and grocery ration.—In September, 1918, the daily vegetable ration consisted of 1,500 g. (3 lb. 5 oz.) of potatoes or 250 g. (8 82 oz.) of beans, peas, &c., or their equivalent in other fresh or dried vegetables, &c.

Groceries at this date included:-

```
16 g. (0.56 oz.)
Coffee (best substitute)...
                                                       1 g. (0.035 oz.)
Sugar (quantity fixed every month by special order)
                                                      37 g. (1·30 oz.)
    for all purposes /...
                                 . .
                                          55 g. (1.94 oz.)
Fats—Butter
                                                    30 g. (1.06 oz.)
      Lard
                                                     125 g. (4.41 oz.)
   or, Jam
                                                     100 g. (3.53 oz.)
   or, Artificial honey ...
```

Drink ration.—The troops are provided with mineral water by the Intendance.

A special ration of tea 1 g. (0.035 oz.), or a ration of brandy, 0.05 litres (0.09 pint), is allowed for front troops during periods of heavy fighting. Under conditions of specially arduous work, the ration is also allowed to troops in the rear.

Tobacco ration .- For non-commissioned officers and men only, the daily ration consists of—

1 cigar and 4 cigarettes, or 30 g. (1.06 oz.) pipe tobacco, or 5 g. (0·176 oz.) snuff.

Forage ration.—In September, 1918, the maximum scale was:—

	Oats, barley, maize.	Hay.	Straw.
Heaviest horses	14:33 lbs. (6:5 kg.)	15 ·43 lbs. (7 kg.)	11 ·02 lbs. (5 kg.)
	11:02 lbs. (5 kg.)	11 ·02 lbs. (5 kg.)	6 ·61 lbs. (3 kg.)
	6:61 lbs. (3 kg.)	7 ·71 lbs. (3 ·5 kg.)	4 ·40 lbs. (2 kg.)
	3:30 lbs. (1:5 kg.)	4 ·4 lbs. (2 kg.)	2 ·20 lbs. (1 kg.)

or a proportion of substitutes (cake fodder, molasses, potatoes, &c.).

7. Arrangements for feeding troops during a battle.—Much stress is laid on the necessity for the troops taking several days' rations up with them into the line. The amounts considered necessary vary, but the general opinion is that 5 days' rations are the minimum; these need not necessarily be "iron rations."

In order to provide the troops with warm food, the Germans issued solidified alcohol with which food could be warmed up, or else took the food up in "food carriers" and coffee cans. The latter method is, however, rarely applicable beyond the support trenches.

In addition to the rations carried by the troops, large ration depôts, each containing several thousand rations, were formed close behind the positions; carrying parties brought these rations up into the trenches whenever pauses in the artillery fire permitted.

8. Water supply.—Generally speaking, most of the water in Northern France and Belgium is not fit for drinking purposes unless sterilized by boiling or other methods.

Soon after trench warfare became an established fact, the Germans organized local systems of water supply for the men in the trenches. As much use as possible was made of existing systems, pipe lines being laid from existing waterworks, or branching off from existing mains. In other cases pipe lines were laid from wells, and pumps were installed; intermediate reservoirs were built, or the vats of breweries and sugar factories were employed as reservoirs. In some places new wells were sunk. The pipe lines were led into villages close behind the front or even into the support trenches.

These methods of supply sufficed until the battle of the Somme in 1916, when the pipe lines were soon cut by the heavy bombardment, and the water had to be carted or carried up to the trenches.

To meet these new conditions, the Germans established or took over existing mineral water factories behind the front, and stored large quantities of bottled mineral water in and close behind the line.

The men took two filled water-bottles with them into the trenches, or, in some cases, were issued with special large tin water-bottles.

9. The Salvage Service.—The following information regarding the German Salvage Service has been obtained from documents recently captured:—

(a.) Salvage troops.—These consist of salvage companies (Sammelkompagnien) in Army areas and storage detachments (Bergetrupps) in the Lines of Communication areas.

(b.) Organization.—The Salvage Service is directed by carefully selected, energetic officers.

^{*} Some of these "food carriers" are constructed on the principle of the "Thermos flask," and keep the food warm for several hours.

At each Army Headquarters there is an Army salvage officer (Sammeloffizier), assisted by one or more officers. He controls salvage work in the Army and remains permanently

in the Army area.

At Corps Headquarters there is a Corps salvage officer (Gruppensammeloffizier), who is responsible for and directs the salvage operations of the divisions in the Corps. He applies to Army Headquarters for the necessary salvage units and allots them to divisions as required. He remains permanently in the Corps area.

In each division there is a divisional salvage officer (Divisionssammeloffizier). He

moves with the division.

Regimental salvage officers (Truppensammeloffiziere) are appointed in each regiment

and battalion. They are employed exclusively on salvage duties.

(c.) System of salvage.—During trench warfare the material salved by troops in line and by the salvage companies is brought to a forward salvage dump (Truppensammelstelle) situated close to the front line, and is then usually sent to an intermediate salvage dump (Zwischenlager), situated farther back, where it is placed in charge of the battalion. From the forward or intermediate dumps the material is despatched by the regiment, employing its own transport, to the divisional salvage dump (Divisionssammelstelle), situated near a station served by a narrow or normal gauge railway, whence it is despatched to the Army despatching station (Armee-Versandstelle) in the Lines of Communication area. At this station the material is sorted and despatched to Germany or elsewhere.

During an offensive it still remains the duty of the troops to carry out salvage work themselves, especially as regards their own ammunition. The responsibility for salvage work behind the fighting troops lies, in the first place, with the salvage companies and the labour troops specially detailed for the purpose. The fighting troops are closely followed by salvage parties, who undertake the immediate collection and guarding of material of

special importance, handing it over to the salvage companies when they arrive.

In rest billets, the troops hand over collected material to the camp salvage dump

(Lager-und Ortsunterkunftsammelstelle), which is under the town major.

(d.) Methods of stimulating salvage work.—It is constantly impressed on all ranks by an organized salvage propaganda that, on account of Germany's precarious economic situation, absolutely nothing must be wasted, and that active salvage work is a patriotic duty.

The collection of salvage is further stimulated by an extensive system of rewards.

CHAPTER XV.

MEDICAL AND VETERINARY SERVICES.

1. General organization of the Medical Service.—The Army Medical Service consists of the corps of medical officers (Sanitäts-Offizier-Korps); the medical rank and file consists of the Sanitätsmannschaft, forming the medical units in the field, and the Militär-krankenwärter or hospital orderlies. In addition to the above there is the regular establish-

ment of regimental stretcher bearers (Krankenträger).

The medical service of the Field Army is under a Director-General (Chef des Feldsanitätswesens). He is attached to General Headquarters and controls the medical service in the theatre of operations and on the Lines of Communication. With the Headquarters of each Army in the field there is a Director of Medical Services (Armee-Arzt) with the rank of Obergeneralarzt. Each Corps has a Generalarzt as Deputy Director of Medical Services (Korpsarzt). At the Headquarters of each Corps there is a consulting civil surgeon (beratender Chirurg). Each division has a Divisionsarzt as Assistant Director of Medical Services. For the grades of medical officers, see page 23.

- 2. Medical organization in the field.—The German medical organization for battle comprises the following échelons from the firing line to the back areas:—Regimental Medical Service; Bearer Companies (Field Ambulances); Field Hospitals; Motor Ambulance Convoy or Column; War Hospitals; Ambulance Trains and Temporary Ambulance Trains; Advanced Depôts of Medical Stores. (See diagram showing medical arrangements in force for the "Cambrai" Group during the fighting in September, 1917.)
- 3. Regimental medical service.—Normally there are with each battalion two medical officers, four medical non-commissioned officers (one with each company), and 16 stretcher bearers, with a senior medical officer for the regiment. At the end of May, 1916, a fifth medical non-commissioned officer was added to each battalion. The stretcher bearers are borne on the establishments as non-combatants and wear the Red Cross brassard.

In the trenches each company formed a medical dug-out or aid post just behind the fire trench, but owing to the large number of casualties amongst the medical officers, it was considered inadvisable to let the battalion medical officers go forward to the fire

trench.

A large regimental aid post or dressing station (Truppenverbandplatz) is established further back, usually in or near the second support trench, and accommodated in well constructed dug-outs or in cellars. The dug-outs are constructed to hold 30 wounded. A telephone is provided, and supplies of lighting materials, extra rations, dressings and medical comforts to cover periods of five days or more are maintained in the aid post.

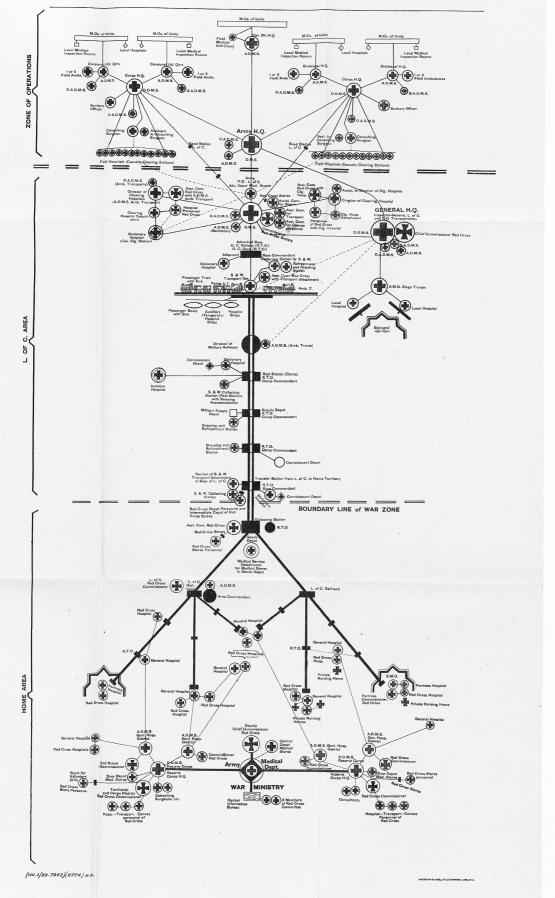
Similar aid posts are formed for groups of three or four batteries of artillery, if the

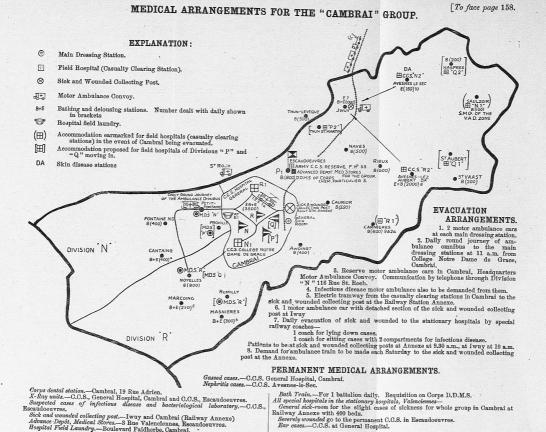
latter are not too far apart,

GERMAN SCHEME OF FIELD MEDICAL ORGANIZATION.

= Army Medical Service







secundoeuvres.

Sick and wounded collecting post.—Iwuy and Cambrai (Railway Annexe)

Advance Depôt, Medical Stores.—3 Rue Valenciennes, Escaudoeuvres.

Hospital Field Laundry.—Boulevard Faidherbe, Cambrai.

[To face page 158.

The personnel on duty in a regimental aid post normally consists of three battalion medical officers, and a detachment of eight stretcher bearers with two stretchers from the bearer company. Wounded are brought to the regimental aid post by the battalion stretcher bearers, and are kept there as short a time as possible, being evacuated by the bearer company.

In back areas the regimental medical service opens a local medical inspection room and ward for detained cases (Ortskrankenstube), where patients may be kept up to five days.

4. The bearer company (Sanitätskompagnie) or field ambulance consists of elements equivalent to the bearer division and the tent division of our field ambulance. A bearer company is commanded by an Oberstabsarzt, and its strength is 8 officers and 240 other ranks. The stretcher bearers are organized in two sections, with non-commissioned officers and other ranks under officers who are not medical officers, and with a medical officer (Stabsarzt) in medical charge of the sections; and there is also a main dressing station detachment of eight medical officers, including the senior medical officer in command.

One of these companies forms part of each division. During the battle of the Somme in 1916 this was not found sufficient, and there was a demand for two bearer companies for a division in the fighting line. The bearers of the one company became exhausted, and it was necessary to establish a relief company to cope with the work of collecting and bringing back wounded. An additional number of independent bearer companies were formed in 1917, in order to reinforce particular divisional sectors during a battle.

The posts established in action by the bearer company were :-

(a.) A wagon rendezvous (Wagenhalteplatz).

(b.) A main dressing station (Hauptverbandplatz).
(c.) A collecting station for slightly wounded (Leichtverwundeten-Sammelplatz).

(a.) The wagon rendezvous is placed in advance of the main dressing station and about 4,000 yards behind the regimental aid post. Dug-outs are constructed at this post, and arrangements are made for giving hot food and drinks to wounded coming back. A dump for issue of medical and surgical material to the regimental medical service has also to be maintained by the bearer company at or near the wagon rendezvous. The post is provided with a telephone. The personnel consists of a small detachment of the stretcher bearers under a non-commissioned officer, and a medical officer is placed on duty there from time to time by order of the divisional Assistant Director of Medical Services. One or more of the ambulance wagons of the company are kept constantly at the wagon rendezvous, and go forward at night to meet the bearers bringing back wounded. The wagon rendezvous performs much the same function as our advanced dressing station.

(b.) The main dressing station is established in a shell-proof shelter in some village 6 or 7 miles from the front line. The personnel may be reinforced from the regimental medical services or from field hospitals; but it is not to be used for reinforcing or replacing medical officers of either of these échelons. All wounded coming back from the regimental medical service must pass through this post. Two or more motor ambulance cars are allotted to it, and one motor omnibus.

The walking cases are sent back to the main dressing station, after being collected at

the wagon rendezvous, in small groups and in march formation.

Every wounded man must have two diagnosis tallies (field medical cards) attached. These tallies have two red perforated margins. If a man is able to walk (marschfähig), both margins are torn off: if classed as fit for transport (transportfähig), one margin is torn off; if unfit for transport (nicht transportfähig), the card is left intact. A man coming back

to the main dressing station or wagon rendezvous without a field medical card, or without authority, is sent back to his unit, unless he is found to be suffering from sickness or wound, in which case the card is attached at the main dressing station and the unit informed. This procedure is adopted to prevent men straggling back from the front who have nothing the matter with them.

Amongst the special equipment attached to one of the main dressing stations in a

Corps area is a water sterilizing wagon.

(c.) The collecting station for slightly wounded is established further back, at or near an entraining station. The walking cases are sent on from the main dressing station, either in march formation or in the motor omnibus or other vehicles.

5. Field hospitals (Feldlazarette), originally 12 per Corps, are now allotted on the scale of 2 per division and 2 per Corps Headquarters. They are used, in the same way as we use casualty clearing stations, for the retention of cases unfit for transport and for special cases. The number of medical officers in each is six. Normally equipped for 200 beds, they are expected to accommodate as many cases as required. They are opened in various villages in the back area.

Field hospitals are organized during a battle to deal with special cases, advanced operating centres being arranged near the main dressing stations. There are also special field hospitals allotted for severely wounded, special surgical cases, Röntgen ray examination, dental cases, gassed cases and infectious cases. These field hospitals are army

troops and remain semi-permanently in sectors.

6. Motor ambulance convoys (Sanitäts-Kraftwagen-Kolonnen).—The composition of these has not been definitely ascertained. There was no war establishment laid down for them before the war. They appear to be a collection of motor ambulance cars and omnibuses, parked under an officer at some village or locality in telephonic communication with medical units, and used for the conveyance of sick and wounded from the main dressing station to the entraining station or to field hospitals on demand.

One of these motor ambulance convoys is allotted to each Group (Corps).

- 7. The ambulance convoy detachment (Sanitäts-Kraftwagenabteilung) is a definite unit, divisible into three sections and allotted in the proportion of one to each Army. It has a normal establishment of 800 motor ambulances. The personnel of a detachment consists of from five to seven medical officers and 820 other ranks, including 650 drivers. Its function is to open reception shelters, dressing stations and refreshment rooms at stations where sick and wounded entrain, and take care of them while awaiting evacuation by railway. It is also a distributing centre for classifying patients for evacuation to various field hospitals or war hospitals, opened for the reception of special cases in the villages in Army and advanced Lines of Communication areas. It makes arrangements for the comfort of sick and wounded during the journey back, and, with the special equipment held for the purpose in advanced depôts of medical stores, fits out empty returning trains as temporary ambulance trains.
- 8. War hospitals (Kriegslazarette) are used in much the same way as we use stationary hospitals in advanced areas. The number is not fixed and depends on localities available for opening them. Their equipment and personnel are obtained, as required, to a great extent from local resources or depôts of medical stores; but there is a nucleus of the personnel in the form of a definite unit called the War Hospital Detachment (Kriegslazarettabteilung), mobilized in the proportion of one for each Corps. The strength of a

detachment appears to be 12 medical officers, 30 medical N.C.O.s, 450-500 medical orderlies, 250-300 sisters and about 100 Red Cross volunteers. It is administered by a Kriegslazarettarzt-Direktor. An Etappearzt has several detachments under him. These units are now Lines of Communication troops. They are intended for the more or less continuous treatment of special classes of wounds and injuries, which are not sent back to Germany. Hospitals for infectious diseases (Seuchen-Lazarette) are also organized.

The unit is used for the same purpose for which we use the evacuation section of our

casualty clearing stations.

9. Ambulance trains (Lazarettzüge).—Ambulance trains normally run to within 10 or 15 miles of the front line. Both slightly and severely wounded are also sent back on narrow-gauge railways.

10. Advanced depôts of medical stores (*Gruppen—Sanitāts-Speicher*).—These are allotted to Corps sectors, and are usually situated near Corps Headquarters. The divisional bearer companies are responsible for bringing up stores to a dump for issue to regimental medical services. The advanced depôts refill from the Lines of Communication medical depôts (*Etappen-Sanitāts-Depots*).

11. The Veterinary Service.—The Army Veterinary Service consists of the corps of veterinary officers (Veterinar-Offizier-Korps) and sub-veterinary surgeons (Unterveterinare). Like medical officers, veterinary officers are assimilated in grade to combatant officers, but have no combatant rank. For the grades of veterinary officers, see page 23.

The Army Veterinary Service is under a Director-General (Generalveterinar). Under him are three principal veterinary officers (Chefveterinare) in the Western, Eastern and

South-Eastern Theatres.

The Korpsveterinär is the veterinary adviser of the Corps commander, and is responsible for all veterinary services throughout the Corps.

Each division has a veterinary hospital (Pferde-Lazarett), which is administered by

the Divisions veterinar, and corresponds to our mobile veterinary section.

With each cavalry or field artillery regiment there is a Regimentsveterinar, and the lower ranks of veterinary officers (Oberveterinar and Veterinar) are attached to cavalry squadrons and field artillery Abteilungen. According to the peace establishment, three veterinary officers are attached to each cavalry and field artillery regiment.

Besides the divisional veterinary hospitals there are also veterinary hospitals controlled by Corps and Armies, and the Lines of Communication remount depôts (Etappen-Pferde-

Depots).

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LANDSTURM UNITS.

1. General organization.—All men between the ages of 17 and 45 who have not been found fit for war service, and who have not been specially exempted from military service, are incorporated in Landsturm units. Landsturm units are sub-divided into—

(a.) Armed Landsturm (mit Waffen). (b.) Unarmed Landsturm (ohne Waffen).

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The Armed Landsturm consists of the men passed as "fit for garrison duty" (Garnisonsdienstfähige); the Unarmed Landsturm consists of those passed as "fit for labour employ-

ment" (Arbeitsverwendungsfähige).

Every man in the Landsturm, Armed or Unarmed, is liable at any time to be reexamined; if considered "fit for war service" (kriegsverwendungsfähig), he is sent to the depôt of a field unit and eventually takes his place in the ranks as a fighting man, though still retaining the designation Landsturmmann.

2. Organization of the Armed Landsturm.—The Armed Landsturm is organized in battalions, squadrons, batteries and pioneer companies.

The total number of Landsturm units identified up to the 11th November, 1918, was as

Cavalry squadrons	nfantry battalions		•		••	 960
Field artillery batteries	manury partanens					104
Field artillery batteries		• •				3
	'ield artillery batteries	910 · • • 5	 •			12
Pioneer companies (including pioneer park companies)	last antillary hattaries		 	10000	198 • •	

Of the 960 Landsturm infantry battalions, over 90 have been grouped to form 41

Landsturm infantry regiments, which are mostly employed on the Russian Front.

The greater part of the Armed Landsturm is organized in independent battalions. These battalions are designated by a serial number in each Army Corps District; thus, "Landsturm Infantry Battalion VIII/10" means the 10th Landsturm Infantry Battalion raised in the VIII Army Corps District. Landsturm battalions have also a subsidiary title dependent on their town of origin; thus, "Landsturm Infantry Battalion VIII/10" is also known as the "2nd Landsturm Infantry Battalion, Coblenz."

3. Employment of the Armed Landsturm.—A certain number of Landsturm bartalions, principally those which have been incorporated in regiments, have been

^{*} It is probable that a number of these batteries have been disbanded.

employed in front line, but this procedure is still comparatively rare. Landsturm units only appear in front line on the Eastern Front, or in quiet sectors of the Western Front such as Lorraine or the Vosges.

In general, the battalions of Armed Landsturm are employed as-

(a.) Garrisons of the coast defences. (b.) Guards for neutral frontiers.(c.) Garrisons of inland fortresses.

(d.) Guards for the Lines of Communication.

(e.) Guards for prisoners of war.

(f.) Garrisons of the occupied territories. (g.) Landsturm depôt and training battalions.

(a.) Garrisons of the coast defences.—The coast defences, which used to be almost entirely in the hands of the Admiralty, were in 1916 placed under an independent military commander.

In addition to naval units, the troops allotted to the coast defences consist of 50 battalions of Armed Landsturm belonging to the Army Corps Districts adjoining the coast (X, IX, II, XVII and I). These battalions are distributed as follows:—

North Sea (20 battalions).

8 battalions (X) defending the Frisian Islands, mainly at Borkum and Norderney,

4 battalions (IX) defending the estuary of the Weser.

8 battalions (IX) defending the west coast of Schleswig, mainly at Sylt.

Baltic (30 battalions).

- 12 battalions (IX) defending the east coast of Schleswig, mainly at Alsen, Kiel and Lübeck.
- 10 battalions (II) defending Stettin and the Island of Rügen.

4 battalions (XVII) at Danzig.

- 4 battalions (I) at Königsberg and Labiau.
- (b.) Guards for neutral frontiers.—The troops allotted to guard the German land frontiers consist of about 40 Landsturm battalions. The majority of these are concentrated on the Dutch and Swiss frontiers; only a few are on the Danish frontier.
- (c.) Garrisons of inland fortresses.—The fortress garrisons consist of 20 garrison battalions drawn from the Armed Landsturm.

They exist at Posen, Breslau, Strassburg, Graudenz, Lötzen, Marienburg, Soldau,

Ingolstadt and Regensburg.

(d.) Guards for the Lines of Communication.—About 12 Landsturm battalions are employed on the Lines of Communication Inspectorate (Etappen-Inspektion) allotted to each Army.

In all, about 200 Landsturm infantry battalions are employed in this way.

(e.) Guards for prisoners of war.—There are about 150 prisoners of war battalions (Kriegsgefangenen-Arbeiter-Bataillone), each consisting of about 2,000 prisoners of war, guarded by 150 to 200 men of the Armed Landsturm,

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(f.) Garrisons of the occupied territories.—The Military Governments (General-Gouvernements) in Poland, Belgium, Serbia and Roumania are safeguarded by permanent garrisons of Armed Landsturm battalions, as well as by the field units resting in the

In Belgium there are 90 Landsturm battalions forming the permanent garrison, and in

Poland 40 battalions.

The Belgian garrison is distributed in groups of 5 to 12 battalions at the main railway junctions, such as Liége, Antwerp, Brussels, Namur and Ghent. The remaining battalions are distributed singly or in pairs along the main railway lines and along the Dutch frontier, which is also guarded by a number of Landsturm squadrons.

In addition to the ordinary Landsturm infantry battalions, there are a few permanent garrison battalions stationed at certain places such as Antwerp, Brussels, Charleroi, Ghent,

Hasselt, Liége, Luxemburg, Malines, Namur and Soignies.

(g.) Landsturm depôt and training battalions.—Among the series of Landsturm infantry battalions formed in each Army Corps District are a certain number of Landsturm Infanterie-Ersatz-Bataillone. These units serve as depôt battalions: there is approximately one Landsturm depôt (Ersatz) battalion for every four Landsturm infantry battalions.

To these depôt battalions are sent all untrained Landsturm men and those rejected as unfit for service at the front. The men in these battalions are employed on light garrison duty in Germany, and are subjected to frequent medical examinations. Whenever they are considered fit for more active work, the men are drafted to Landsturm infantry battalions.

Of a similar nature are the training battalions (Landsturm Infanterie-Ausbildungs-Bataillone), of which there are one to three in each Army Corps District. These units, which assist in training men of the untrained Landsturm, are mainly composed of men of

an inferior type to those incorporated in the depôt battalions.

4. The Unarmed Landsturm.—The Unarmed Landsturm is composed of the remaining men of the Landsturm category who are considered as "only fit for labour employment" (Arbeitsverwendungsfähige). This class is employed on various forms of labour, such as trench-construction, cultivation, road-making, forestry and harvesting.

The auxiliary units of this nature identified up to the end of 1918 were as follows:-

210 Labour Battalions (Armierungs-Bataillone).

67 Road Construction Companies (Strassenbau-Kompagnien).

- 37 Lines of Communication Auxiliary Companies (Etappen-Hilfs-Kompagnien). 28 Lines of Communication Salvage Companies (Etappen-Sammel-Kompagnien).
- 199 Works Companies (Wirtschafts-Kompagnien). 20 Harvesting Companies (Ernte-Kompagnien).

A certain number of skilled workers are incorporated in technical battalions (Facharbeiter-Bataillone).

CHAPTER XVII.

AIR SERVICE.

A.-Aircraft.

1. General organization.—In peace, the German aircraft troops formed part of the Communication Troops, but an Army Order of the 25th November, 1916, definitely established the Air Forces (*Luftstreitkräfte*) as a separate branch, taking precedence between the Pioneers and the Communication Troops. At the same time the Air Forces, including all aviation, balloon and anti-aircraft units, were placed under the orders of a including all aviation, balloon and anti-aircraft units, were placed under the orders of a General Officer Commanding the Air Forces (Kommandierender General der Luftstreitkräfte or Kogenluft), and the post of the Chief of the Field Aviation Service (Chef des Feldflugwesens) was abolished.

The General Officer Commanding the Air Forces is assisted by a Chief Staff Officer

(Chef des Generalstabes der Luftstreitkräfte).

The administration of the Air Forces is carried out by an Inspector-General (Inspekteur der Flieger or Ideflieg). The Inspeckteur der Flieger is also in charge of training units (Kommandeur der Fea or Kodefea.)

2. Training establishments.—In Germany their are now 17 training squadrons (Flieger-Ersatz-Abteilungen or Fea), where pilots, observers and mechanics are trained, in addition to seven Bavarian flying schools.

These training squadrons are situated as follows:-

THESE ITAL		9444	1 VTJ-	6	Böblingen (Württemberg).
1st		Altenburg.	10th		
2nd		Schneidemühl.	11th		Breslau.
3rd		Gotha.	12th		Cottbus.
		Posen.	13th	11. <i>19</i> 60	Bromberg.
4th			14th		Halle a.Š.
5th		Hannover.			
6th	101.00	Grossenhain (Saxony).	15th		Königsberg.
			16th	10	Hagenau.
7th		Braunschweig.			
8th		Graudenz.	17th		Baden-oos.
9th		Darmstadt.			
	D	· - 4 ashoola are s	ituated as	follow	's :

The seven Bavarian flying schools are situated as follows:-

1st Bavarian	Schleissheim (near		avarian	Lager Lechfeld.
2nd ,,	Munich). Neustadt. Fürth.	5th 6th 7th	;; ;;	Gersthofen. Bamberg. Germersheim.
oru "				11 41 0

The 12th, 13th, 14th and 15th Training Squadrons, as well as the 2nd Bavarian Training Squadron, were formed in 1917, while the Bavarian flying schools were expanded during the same period. The 16th and 17th Training Squadrons were formed in 1918.

A training squadron is organized in four companies; the first (Fliegerkompagnie) consisting of pilots, the second (Werftkompagnie) of mechanics, and the third (Ersatzkompagnie) comprising the personnel permanently employed at the training squadron. The fourth company (Rekrutenkompagnie) contains those men who have recently joined and are being instructed in discipline and drill.

The training squadrons for the personnel of giant machines (Riesen-Ersatz-Abteilungen

or Rea) are at Döberitz and Cologne.

Flying schools, at which pilots undergo a course of preliminary training are attached to the greater number of training squadrons; these schools are generally civilian establishments, the property of various aircraft manufacturing firms. In every case the more advanced stages of instruction are undergone at the training squadrons themselves, after pilots have passed through the preliminary school.

While at certain training squadrons the training of observers is undertaken, the more important schools for observers are independent, e.g., the observers' schools at Köln,

Königsberg, Thorn, Jüterbog and Stolp.

3. Organization in the field.—At the Headquarters of each Army in the field there is an Aviation Commander (Kommandeur der Flieger or Koft) and a Balloon Commander (Kommandeur der Luftschiffer or Koluft).

At the Headquarters of each Corps there is a Group Aviation Commander (Gruppenführer

der Flieger or Gruft).

Aeroplane and observation balloon units are allotted to armies in accordance with the

requirements of the situation.

Each Army in the field is provided with an Army Aircraft Park (Armee-Flugpark), which receives new machines from Germany and issues them to units in the field; a store of spare parts is kept and a small amount of repairing work is also carried out. These parks also maintain "pools" of pilots, observers and machine gunners, who are posted to units in replacement of casualties.

4. Aircraft units.—The standard aviation unit is the flight of 6 machines. The establishment of the flight is 115-120 all ranks. The establishment in machines of a bombing flight is 12 and that of a pursuit flight is 18 machines. The actual strength of the former seldom exceeds 10, and of the latter 14.

Observers in reconnaissance units are almost invariably officers, while the pilots in

these units are generally non-commissioned officers.

Aerial gunners in protective (battle) flights, as well as their pilots, are always non-commissioned officers or privates.

Pilots in pursuit flights are either officers or non-commissioned officers.

In the case of bombing flights, observers are always officers, while the pilots may be either officers or non-commissioned officers; aerial gunners are not of commissioned rank. Flights are designated according to the tasks which they perform, as follows:—

(a.) Bombing flights (Bombenstaffeln).—When first organized, at the beginning of 1916, these flights, then called Kampfstaffeln, were intended to act as fighting units (equipped with two-seater machines) and were grouped in six battle squadrons (Kampfgeschwader O.H.L. or Kagohl), each of six flights, allotted as required to armies by General Headquarters. During the Somme battle, the squadron organization was broken up and flights were transferred independently from one army to another; during the winter of 1916/1917 the Kampfgeschwader were partly reformed as bombing squadrons, the flights being employed almost entirely on long distance bombing expeditions and equipped mainly with large twin-engine machines. A number of these Kampfstaffeln were transformed into protective flights (Schutzstaffeln).

At the end of 1918, 27 bombing flights (the name Kampfstaffel was changed to Bombenstaffel in December, 1917) had been identified. These were grouped in bombing

squadrons (Bombengeschwader or Bogohl).

(b.) Pursuit flights (Jagdstaffeln or Jasta).—These first appeared during the Somme battle in 1916, and are equipped throughout with single-seater fighter machines. Before the formation of pursuit flights, two or three single-seater fighter machines were attached to some reconnaissance units. Pursuit flights are allotted to active sectors of the front as required; the principle is to keep the main groups of pursuit flights near the boundaries

of armies or between two active sectors.

Pursuit squadrons are attached to the Headquarters of each Army on an active front, and work directly under the Army Aviation Commander. During the battles of 1917, pursuit flights were formed into groups (Jagdstaffelgruppen), each consisting of about 4 flights; this organization was, however, purely temporary, and was replaced in 1918 by the organization of pursuit flights into squadrons (Jagdgeschwader), each of 4 pursuit flights. Several cases have been found where two or three pursuit flights working independently have been allotted to a Corps, working directly under the Group Aviation Commander; this, however, has only been the case in sectors of intense activity.

In November, 1918, 84 pursuit flights (Nos. 1-81, 84, 86 and 91), and two naval

pursuit flights had been identified.

(c.) Fighting single-seater flights (Kampfeinsitzerstaffeln or Kest.)—These are allotted to important centres, munition factories, railway junctions and depôts, for the purpose of home defence. Eleven of these units have been identified. They are stationed at Mannheim, Saarbrücken, Mainz, Stuttgart, &c.

- (d.) Reconnaissance flights (Fliegerabteilungen and Fliegerabteilungen "A").—The reconnaissance units in the German Air Service were formerly divided into two series: Fliegerabteilungen, of which at the beginning of 1918, 184 had been identified; and Fliegerabteilungen "A" (numbered between 200-299), all of which, at the beginning of 1918, had been identified. The duties and composition of these two types of units do not differ in any way and are now all known as Fliegerabteilungen.* They are allotted to:-
 - (a.) Divisions for trench reconnaissance, photography, contact patrol work and artillery observation; one flight is usually allotted to each division in active sectors.
 - (b.) Corps for trench reconnaissance, photography and artillery observation throughout the Corps counter-battery area; three to four flights are usually allotted to each Corps on active fronts.

(c.) Armies for long-distance reconnaissance and photography; one or two flights are

allotted to Army Headquarters.

A few naval reconnaissance flights (Marine-Landfliegerabteilungen) have been identified working with the Naval Corps in Flanders, also in the Gulf of Riga and the Ægean Sea.

Flights allotted to divisions and Corps are under the Group Aviation Commander; flights working for Armies (called AOK Abteilungen) are under the Army Aviation Commander. Each of these is provided with a mosaic section (Reihenbildzug).

(e.) Protective flights (Schlachtstaffeln or Schlasta).—Schutzstaffeln or Schusta (protective flights) were originally formed from Kampfstaffeln, presumably about September, 1916, and were designed to afford protection to Fliegerabteilungen. Until the autumn of 1918 the establishment of Schutzstaffeln consisted of six machines (Halberstadt and Hannoveraner 2-seaters); it appears to be now eight machines. The pilots and machine-gunners are non-commissioned officers or privates.

During the winter 1917-1918, when a considerable extension of the German Air

^{*} During the second half of 1918, six Fliegerabteilungen were identified operating in Palestine. They were numbered 300-305.

Service was carried out, the duties and equipment of protective flights were modified. About the beginning of 1918 Schutzstaffeln were re-named Schlachtstaffeln (abbreviated Schlasta = battle flights), and were ultimately organized into Schlachtstaffelgruppen (or Schlachtgruppen) and Schlachtgeschwader (battle squadrons).

Several new Schlachtstaffeln were formed during 1918, some from reconnaissance flights coming from Russia; others by drafting machines and personnel from existing battle

flights to the new unit as a nucleus.

The chief duty of Schlachtstaffeln is low-flying, especially in advance of infantry in the attack, which it supports with machine-gun fire, bombs and hand grenades. In addition,

defensive patrols, in formation, are also carried out.

Battle flights are allotted to armies, corps and divisions as circumstances demand. It would appear that they are usually allotted to corps, the aviation commander of which disposes of them as he thinks fit.

In November, 1918, 41 of these units had been identified.

(f.) Giant aeroplane flights (Riesen-Flugzeugabteilungen).—These are employed on long-distance bombing. Only three of these units had been identified at the end of 1918; they are numbered 500 and over. Flights consisted originally of two machines, but appear now to comprise six machines.

5. Types of aeroplanes.—The main types of aeroplanes in use at the beginning of

1918 were as follows:

(a.) Single-seater fighters.

Albatros D. 5.—Tractor biplane; 160 h.p. Mercedes engine; "V" type interplane struts, one pair on each wing. Two '08 pattern machine guns, firing through the airscrew, actuated by a direct flexible drive interrupter gear.

Albatros D. 5 A.—The same as D. 5, only of heavier construction.

Pfalz D. III.—Tractor biplane; 160 h.p. Mercedes engine. "V" type interplane struts, one pair on each wing. Two '08 pattern machine guns, firing through the

airscrew, actuated by a direct flexible drive interrupter gear.

Fokker Triplane.—Tractor triplane; the engine is an imitation by the Oberursel Company of the 110 h.p. Le Rhone. One wide interplane strut between each plane on each wing. Two '08 pattern machine guns, firing through the airscrew, actuated by a direct flexible drive interrupter gear.

Note.—This machine is frequently equipped with captured British and French rotary

engines.

(b.) Two-seater fighters.

Hannoversche Waggon-Fabrik.—Tractor biplane; 200 h.p. Opel-Argus engine; one pair of "V" type interplane struts on each wing; double tail-plane; two elevators, one above and one below the fuselage. One '08 pattern machine gun, firing through the airscrew, and one Parabellum on a turret mounting in the observer's cockpit.

Halberstadt.—Tractor biplane; 160 h.p. Mercedes engine. Top plane level with top longerons; pilot's and observer's seats close together, giving good visibility for both.

Light construction.

(c.) Two-seater reconnaissance machines.

LV.G.—Tractor biplane; 200 h.p. Benz engine; two pairs of vertical type interplane struts on each wing. One '08 pattern machine gun, firing through the airscrew, actuated by an interrupter gear; Parabellum gun on a turret mounting in the observer's cockpit.

D.F.W.—Tractor biplane; 200 h.p. Benz engine, two pairs of vertical type interplane struts on each wing. One '08 pattern machine gun, firing through the airscrew, actuated by an interrupter gear. One Parabellum gun on a turret mounting in the observer's cockpit.

Rumpler.—Tractor biplane; generally fitted with 260 h.p. Mercedes engine, but sometimes with a 260 h.p Maybach engine. Two pairs of vertical type interplane struts on each wing. One '08 pattern machine gun, firing through the airscrew, actuated by an interrupter gear. A Parabellum gun on a turret mounting in the observer's cockpit.

Albatros.—Tractor biplane; 260 h.p. Mercedes engine; two pairs of vertical type interplane struts on each wing. One '08 pattern machine gun, firing through the airscrew, actuated by an interrupter gear. A Parabellum gun on a turret mounting in the observer's cockpit.

(d.) Contact patrol two-seaters.

* A.E.G.—Tractor biplane; 200 h.p. Benz engine. This machine is designed for low

flying and is protected beneath by quarter-inch sheet steel armour-plating.

* Junker.—200 h.p. Benz engine. This machine is designed for low flying and is constructed entirely of metal, large extensions on top planes, no interplane cross-bracing wires.

* Albatros.—New armoured type; 260 h.p. Mercedes engine; two pairs of vertical type interplane struts on each wing. This machine is designed for low flying and is

armoured.

(e.) Bombing machines.

Gotha.—Three-seater twin-engine pusher biplane; two 260 h.p. Mercedes engines; three pairs of vertical type interplane struts on each wing; three Parabellum guns, one in the forward nacelle, the other two in the gunners' cockpit aft; a tunnel built obliquely through the fuselage allows one of these guns to fire downwards and to the rear; approximately 900 lbs. weight of bombs carried.

Friedrichshafen.—Four-seater twin-engine pusher biplane; two 260 h.p. Mercedes

engines; two Parabellum guns; approximately 750 lbs. weight of bombs carried.

A.E.G. - Four-seater twin-engine tractor biplane; two 260 h.p. Mercedes engines; three Parabellum guns, one in the observer's nacelle forward, and two in the gunner's cockpit aft, one of which fires through a trap door in the bottom of the fuselage. 418 lbs. weight of bombs carried.

* Rumpler.—Three-seater twin-engine pusher biplane, fitted either with two 260 h.p.

Mercedes or two 260 h.p. Maybach engines.

* Giant Aeroplane (Riesenflugzeug).—Biplane, Lizenz type, with four 300 h.p. Maybach engines; two pusher and two tractor airscrews. The span is about 140 feet, and the bomb carrying capacity about 5,000 lbs. There are three nacelles, the centre one, with three cockpits, carrying the commander, two pilots and gunners, while each of the side nacelles carries two engines. The crew consists of nine. Four machine guns are carried, one in front and three in rear, one of which fires downwards. Fuel is carried for a flight of 9 hours.

6. Observation balloons.—The balloon service in the field is directly controlled by the General Commanding the Air Forces. The supply of personnel and material is assured

^{*} Specimens of these machines have not yet been captured.

by the Inspectorate of Balloon Troops (Inspektion der Luftschiffertruppen or Iluft) in Berlin. In Germany, there are six depôt units (Luftschiffer-Ersatz-Abteilungen or Lea) at Reinickendorf, Darmstadt, Düren. Mannheim, Königsberg and Munich.

At the Headquarters of each Army in the field is a Balloon Commander (Kommandeur

der Luftschiffer or Koluft), and a balloon report centre (Ballon-Zentrale).

A balloon detachment (Feld-Luftschiffer-Abieilung) is allotted to each Corps headquarters. The balloon detachment, which is merely a staff, consists of 3 officers and about 30 other ranks, mostly employed in connection with photography, maps and signals.

Each balloon detachment controls 2 or 3 balloon sections (Ballonzüge). A balloon section has 2 balloons, one of which is normally kept filled, the other being in reserve. The section is composed of 3 officers and about 110 other ranks. One of the balloon sections on a Corps front is specially told off for tactical observation, and provides the "infantry balloon," which communicates direct with the headquarters of divisions. Otherwise, balloons are almost entirely used in connection with artillery observation, and are linked up direct with the artillery group commanders. The balloon observers are mostly artillery officers. 183 balloon sections have been identified.

The balloons in use are of three sizes, containing 600, 800 and 1,000 cubic metres of gas, respectively. The winding gear consists of a winch and a petrol engine, mounted on

separate vehicles, which are coupled together when the balloon is working.

7. Airships.—Only the naval airship service now exists. The military airship service was broken up during 1917, the useful airships being transferred to the Navy, together with the majority of the military airship sheds. The personnel was distributed partly to the Navy and partly to the military balloon service.

Zeppelia airships are constructed at Friedrichshafen (3 slips) and Spandau (2 slips). The framework is of aluminium. The period of construction extends over 8 to 9 weeks.

Schütte-Lanz airships are now built at Mannheim and Königswusterhausen, near Berlin (one slip each). The period of construction is longer, the framework being of 3-ply wood and very highly finished.

Non-rigid Parseval ships have been practically abandoned.

Airships were formerly allotted indiscriminately to the military and naval services according to current requirements.

During the war the size, the bomb carrying capacity and climbing power of airships

have all increased considerably.

The "Super-Zeppelin" airships of 2,000,000 cubic feet capacity first appeared in the summer of 1916. These ships had six engines.

A modified type was introduced at the beginning of 1917. The ships are of the same

capacity, but all unnecessary weight has been discarded.

There are only five engines actuating four propellers. Each propeller has a direct drive and is placed at the stern of each of the four cars. The after propeller is driven by a pair of engines set tandemwise.

The number of the crew is 2 officers and 16 or 17 other ranks as against a total of

22 in 1916.

These ships can climb to 20,000 feet carrying a load of at least 3,500 lbs. of bombs. At the end of 1917 about 19 ships of 2,000,000 cubic feet capacity were in commission.

The most important airship station is Ahlhorn, which will have accommodation for 12 airships. Nordholz will have accommodation for 8 modern airships and two small training ships. Other North Sea stations are Wittmund (4 ships) and Tondern (2 modern ships). Numerous smaller stations (formerly tenanted by military airships) exist.

The principal Baltic stations include Seerappen, Seddin, Wainoden.

The station of the naval experimental ship is at Jüterbog, near Berlin, formerly the

headquarters of the Army Airship Training School.

The bomb load when raiding is as high as 4,000 lbs. The H.E. bombs are pear-shaped bombs of 100, 220 or 660 lbs. weight. Incendiary bombs weighing 20 to 25 lbs. are also carried.

B.—Anti-aircraft organization.

1. General organization.—Anti-aircraft artillery is under the control of the Commander of the Air Forces, but the personnel is drawn from the artillery.

German anti-aircraft units consist of: -

Anti-aircraft batteries.
Anti-aircraft sections.
Mobile anti-aircraft guns.
Anti-aircraft machine guns.

German anti-aircraft guns are known as Flaks (Flug-Abwehr-Kanonen).

2. Organization in Germany.—(a.) Command.—Anti-aircraft defence in Germany is controlled by the Commander of the Home Aerial Defences (Kommandeur des Heimat-Luftschutzes, abbreviated to Kmdr. Heim. Luft.), whose headquarters are at Frankfurt a. M. This officer is in turn subordinate to the General Officer Commanding the Air Forces (Kommandierender General der Luftstreitkräfte). The local command of groups of anti-aircraft units at important places, such as Duisburg, Essen, Friedrichshafen, Mannheim and Rottweil, is centred in Flak-Gruppen or Flak-Kommandos. The Home Aerial Defence Troops (Heimat-Luftschutz-Truppen) wear red shoulder straps bearing a shell with wings.

(b.) Aeroplane reporting service.—The Commander of the Home Aerial Defences has under his orders an Aeroplane Reporting Service (Flugmeldedienst) controlled by three Stabsoffiziere des Flugmeldedienstes (Stabsoffiz Melde Heim.), the principal being the Stabsoffizier des Flugmeldedienstes Süd at Karlsruhe. These officers control a number of

Aeroplane Observation Posts (Fliegerwachen, Fliegerwarten).

(c.) Fixed anti-aircraft sections (Ortsfeste Flakzüge)* form a series of units, numbered from 1 upwards, with the letter "O" affixed to each number. They are all located in the interior of Germany or in rear of the Zone of the Armies. To each section is attached an anti-aircraft searchlight section (Flakscheinwerferzug), consisting of 3 non-commissioned officers, 10 men, and one 90-cm. naval projector.

(d.) Anti-aircraft batteries.—In addition to the anti-aircraft batteries (Flak-Batterien) allotted to Armies in the field, there is a series numbered between 1 and 100, chiefly

employed in defending towns, railway junctions and munition factories.

(e.) Schools and depôts.—In Germany there are a number of anti-aircraft depôts (Flak-Ersatz-Abteilungen) under the Commander of the Anti-Aircraft Depôts (K. der Flakean) at Frankfurt a/M. The Anti-Aircraft School of Instruction is at Ostend, and the Anti-Aircraft Searchlight School (Flak-Scheinwerfer-Schule) is at Hannover.

3. Organization in the field.—(a.) Command.—In each Army the anti-aircraft units (including anti-aircraft searchlights) and the aircraft reporting service are placed under the control of an officer at Army Headquarters, known as the Commander of the Anti-Aircraft Guns (Kommandeur der Flugabwehrkanonen, abbreviated to Koflak).

^{*} In the summer of 1918 searchlight batteries appear to have existed, the strength being 1 officer, 64 non-commissioned officers and men, with 4 searchlight, 4 gas engines and dynamos, and the necessary transport, and also 4 machine guns with teams.

In each Corps the anti-aircraft defences are organized in a group (Flakgruppe), under

an officer known as the Commander of the Anti-Aircraft Group (Flakgruko).

(b.) Aircraft reporting service.—The anti-aircraft defences in an Army are organized in several lines of observation, connected to the corresponding lines of the Armies on the flanks. These lines consist of aircraft reporting and look-out stations (Fliegerwachen, Flugwachen, or Fliegerwarten) and aircraft report centres (Flugmeldestationen), which are in telephonic communication.

The Commander of the Anti-Aircraft Guns (Koflak) is responsible for the supervision of

the entire system.

(c.) Anti-aircraft sections (Flakzüge) are armed with guns of 7.7-cm., 9-cm. or 10-cm. calibre. There are two series, one numbered from 1 to 200, and the other from 401 upwards. These units were formerly attached to divisions but are now sector troops. They are horse-drawn.

(d.) Sections of automatic anti-aircraft guns are armed with automatic or Q.F. guns of 2-cm. and 3.7-cm. calibre. They are distinguished by the letter "M" (Maschinen-Flakzüge),

and form a separate series numbered between 1 and 200.

(e.) Anti-aircraft guns on motor lorries are usually 7.7-cm. guns employed singly, and are designated Kraftwagen-Geschütze or Kraftwagen-Flugabwehrkanonen (K-Flaks). They form a special series numbered between 1 and 100, the number being followed by the letter "K."

(f.) Anti-aircraft batteries (Flak-Batterien) in the field consist of three series, one numbered from 301 to 400, another from 501 to 600, and the third from 701 upwards. These batteries, like the Flakzüge, are armed with 7.7-cm., 9-cm. or 10-cm. guns. There is also a further series (numbered between 101 and 200) mounted on motor lorries (K. Flak-Batterien). An anti-aircraft battery consists of 4 guns (3 if on motor lorries).

4. Anti-aircraft guns.—(a.) 2-cm. gun.—The German designation is 2 cm. Flak-Grabenkanone or 2 cm. Flugzeugkanone. This gun fires tracer shot; maximum range, 3,500

yards, or a maximum height of 2,734 yards; rate of fire, 120 rounds per minute.

(b.) 3.7-cm. guns.—The German designations are 3.7 cm. Flak. and 3.7 cm. Masch.-Flak. (or M.-Flak.). The latter is of the 1-pr. pom-pom type, and probably fires both H.E. shell and tracer shot; maximum range, at least 3,280 yards.

(c.) 7.7-cm. guns. -- Various types of these are known :-

(a.) The 96 n/A. pattern field gun on an improvised mounting. (b.) A 7.7-cm. gun on a pedestal mounting (7.7 cm. Sockel-Flak).

(c.) 7.7-cm. L/35 gun. This is probably the new 1916 pattern field gun on howitzer mounting (K.i.H.=Kanone in Haubitz-Lafette.)* (F.K. 16.)*

(d.) 7.7-cm. guns mounted on motor lorries (Kraftwagengeschütze).

(b.) and (c.) are described in an official German publication as pferdebespannte=horse drawn.

7.7-cm. anti-aircraft guns fire a 15 lb. shell, the 1915 pattern H.E. shell with the When used with anti-aircraft ammunition these fuzes contain no K.Z.11 Gr. fuze.

* A German official document, dated 18.9.16, states as follows with regard to the K.i.H. field gun, of

which the 1916 pattern field gun is a modification:—

"The K.i.H. field gun can be used for anti-aircraft fire, but is not designed for it. Antiaircraft fire entails elevations up to 70°, and to obtain these with a K.i.H. gun necessitates mounting it on a fixed mounting. This is not so easily done with a K.i.H. field gun as with a 96 n/A. field gun. The 96 n/A field gun on a fixed mounting is a more handy weapon for antiaircraft fire than the K.i.H. field gun; besides the latter should be diverted as seldom as possible from its legitimate employment, which is long range fire."

percussion system. As a distinguishing mark the cap of the fuze is painted yellow. The

maximum range is 7,874 yards, and the rate of fire is about 20 rounds per minute.

(d.) 9-cm. gun.—Some of the old-fashioned '73 and '73/'88 pattern 9-cm. field guns have been adapted for anti-aircraft work. They are known as 9 cm. K.73 auf Sockel and 9 cm. Ballon-Abwehr-Kanonen (9 cm. B.A.K.). They fire a $17\frac{1}{2}$ lb. shell, the 1914 pattern H.E. shell and the 1915 pattern shrapnel, both fitted with a time fuze marked Dopp.Z.92.lg. Brlg.o. Az. (o. Az. = ohne Aufschlagzündung = without percussion fuze). The maximum range is 7,109 yards.

(e.) 10-cm. guns.—The 10-cm. gun, 10-cm. gun '04, 10-cm. gun '97, and 10-cm. gun '14

are all used for anti-aircraft work on a pivot mounting (Sockel).

The following details are known:-

	9			Maximum range.			
Gun.		Shell.	Fuze.	Time.	Perc'n.		
{ 10·cm. gun 10·cm. gun '04	}	10 cm. Gr	Dopp. Z. 92 f. 10 cm. K	yards. 8,968	yards.		
{ 10-cm. gun 10-cm. gun '04 { 10-cm. gun '97 10-cm. gun '14	::}	10 cm. Schr. 96	Dopp. Z. 92 lg. Brlg	11,264 12,085	11,264 12,085		

(f.) Heavy guns employed against captive balloons:-

		efon elsando yus, du	Maximum range.		
Gun.	Shell.	Fuze.	Time.	Perc'n.	
12-cm. heavy gun (s. 12 cm. K.)	12 cm. Schr. 15	Dopp. Z. 92	yards. 7,218	yards. 7,983	
13-cm. gun (13 cm. K.)	13. cm. Schr	Dopp. Z. 92 lg. Brlg	15,311	15,311	
15-cm. experimental gun, on wheeled carriage (15 cm. Vers. K.i.R.L.).	15 cm. Schr. 03 (gr.) 15 cm. Schr. 03 (gr.) (Haube)	Dopp. Z. 16 (clock- work fuze).	about 18,600 21,107	about 18,600 21,107	
15-cm. gun, with overhead shield (15 cm. K.i.S.L.).	15 cm. Schr. 03 15 cm. Schr. 03 (gr.) 15 cm. Schr. 30 (gr.) (Haube)	Dopp. Z. 92 lg. Brlg Dopp. Z. 16 (clockwork fuze).	16,186 over 17,500	17,060 over 17,500	
15-cm. long gun (lg. 15 om. K.)	15 cm. Schr. 15	Dopp. Z. 92	8,968	10,936	

ereti er isunen korkinar	nte decado en printes de la Sente.		Maximum range.		
Gun.	* Shell.	Fuze.	Time.	Perc'n	
15-cm. gun, with chase rings (15 cm. R.K.).	15 cm. Schr. 15 m.v.F. (m.v.F.) = with forward driving band).	Dopp. Z. 92	yards. 7,546	yards. 7,546	
15-cm. long gun, with chase rings (lg. 15 cm. R.K.).	15 cm. Schr. 15 m v.F	Dopp. Z. 92	7,929	7,939	
24 cm. Q.F. gun L/40	Shrapnel with false cap	Dopp. Z. 16 (clockwork fuze).	at least 22,000	at least 22,000	

(g.) Miscellaneous.—Captured French (75-mm.) and Russian (7.62-cm. L/30) field guns have also been adapted for anti-aircraft work. The Russian guns are referred to in a document as pferdebespannte 7.62 cm. russ. 00 u.02, i.e., 1900 and 1902 patterns 7.62-cm. Russian field guns, horse drawn. The most favourable range of the latter is from 6,500-7,500 yards.

Several of these converted Russian field guns, on wheeled carriage, have been captured. They fire a 15-lb. H.E. shell of German manufacture, fitted with K. Z. 11 Gr. time fuze,

specially graduated in seconds up to 30 seconds.

In addition to the army guns enumerated above, there are various patterns of naval anti-aircraft guns, including an 8.8-cm. gun which is in general use on the Belgian coast. There are also 8.8-cm. naval guns on pivot mountings on railway trucks (Eisenbahn-Sockel-

Batterie.)

- 5. Anti-aircraft machine gun detachments.—During 1917, two series of antiaircraft machine gun detachments (Flugabwehr-Maschinengewehr-Abteilungen or Flamga) were formed; the first was numbered from 801 upwards, the second from 901 upwards. Of the former, only the first three have been identified; of the latter, the highest number identified is 940. It is reported that each detachment consists of three companies of about 80 men under a lieutenant, the whole commanded by a captain. Each company is armed with 12 machine guns, '08 pattern, and each gun is served by one non-commissioned officer and 5 gun numbers. The full complement of ammunition for each gun consists of 18 cases with 2 belts of 250 rounds each, no tracer bullets.
- 6. Balloon barrage detachments.—Since the beginning of 1917 the Germans have endeavoured to protect important industrial centres by the employment of balloon barrage detachments (Luftsperrabteilungen). Each barrage comprises a number of captive balloons, which are let up to a maximum height of about 7,000 feet whenever an air raid is expected. The balloons are about 500 feet apart.

Seven numbered barrages have been identified, mainly stationed near Metz,

Diedenhofen, Saarbrücken, and important iron-ore works in Lorraine.

There appears to be a continuous balloon barrage along the valley of the Saar from Dillingen to Saargemund,

CHAPTER XVIII.

UNIFORM.

(See Plates 2 to 11, at end.)

1. General.—Before the war, the German Army possessed two different uniforms,

one for parade and one for field service.

The field service uniform (feldgraue Uniform), which was introduced in 1910, is now the only pattern met with in the field, the old dark-blue uniform (dunkelblaue Uniform) being obsolete.

In 1915, a new field service uniform was introduced, comprising a tunic for wear in time of peace, and a jacket (Bluse) for wear on field service. A detailed description of the

new field service uniform is given in Appendix A (page 185).

The colour of the field service uniform is "field-grey" (feldgrau) for all arms with the exception of the following units, which wear a greener colour known as "grey-green" (graugrün):—

(a.) All Prussian and Saxon Jäger battalions, but not Bavarian Jäger battalions.

(b.) The 108th Schützen Regiment and the Guard Schützen battalions.

(c.) Jäger zu Pferde regiments.

(d.) Machine gun units. (e.) Staff orderlies.

2. The field service tunic.—All arms and units, except certain cavalry regiments, wear the single-breasted tunic (Waffenrock) with coloured facings, and eight dull metal buttons embossed with a crown (with a lion for Bavarian troops). The skirts at the back of the tunic are slashed and have six similar buttons. The tunic has side pockets closed by buttons.

The front of the tunic, as well as the skirt behind, is edged with scarlet piping (green

for Jäger and Schützen).

The tunic has a stand and fall collar closed by a hook and eye. The collar is edged with coloured piping as follows:—

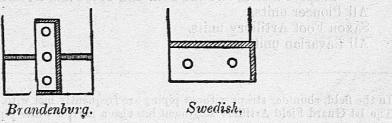
(a.) Scarlet for Infantry.

(b.) Green for Jäger.

(c.) Black for Schützen, Artillery, Pioneers, Air Service, Telegraph and Communication Troops.

(d.) Blue for Train.

The cuffs are either of the Brandenburg or Swedish pattern. The Brandenburg cuff has three buttons placed vertically; the Swedish cuff has two buttons placed horizontally. The piping on the cuffs is of the same colour as that on the collar (see above).



Guard and Grenadier units are distinguished by patches (Litzen) of white or yellow braid on collar and cuffs. The Brandenburg and Swedish cuffs have three and two Litzen respectively, one for each button.

The trousers (Tuchhose) worn by dismounted units are of the same colour as the field service tunic. Jäger units wear green piping down the seam, this piping being red in the

case of all other units.

The pantaloons (Reithose) of mounted units are of field-grey cloth with red piping. Jäger zu Pferde regiments have green piping, and hussar regiments wear a braid stripe down the seam.

The wearing of puttees is sanctioned for aircraft units, assault battalions and mountain

The marching boot is a half-boot of the Wellington pattern.

3. Shoulder straps of the field service tunic.—The tunic is provided with fieldgrey (or grey-green) shoulder straps, which bear either the number or the monogram of the regiment worked in red (see Plate 2). Foot Guards and Horse Guards regiments have plain shoulder straps. Reserve, Landwehr and Ersatz regiments wear the same number on their shoulder straps as the corresponding Active regiment, but not the monogram.

The shoulder strap is fastened with a metal button which bears the number of the

man's company, &c.

The shoulder strap is edged with piping,* the colour of which varies for different units as follows :--

White piping.-

1st, 3rd and 5th Foot Guards Regiments, and 1st and 5th Guard Grenadier Regiments. Infantry regiments of the I, II, IX, X and XII Army Corps Districts and the 109th Body Grenadier Regiment, 110th Grenadier Regiment and 116th Infantry Regiment.

Field Artillery regiments of the I, II, IX, X and XII Army Corps Districts.

All Foot Artillery units (except Saxon).

All independent machine gun units.

Scarlet piping-

2nd Foot Guards Regiment and 2nd Guard Grenadier Regiment. Infantry regiments of the III, IV, XIII, XV and XIX Army Corps Districts, and the 111th, 115th (Body Guard), 168th, 169th, 171st, 172nd Infantry Regiments and 2nd Bn. 89th Grenadier Regiment.

† 1st and 2nd Guard Field Artillery Regiments. Field Artillery regiments of the III, IV, XI, XIII, XIV, XV and XIX Army Corps Districts and the 25th and 61st Field Artillery Regiments.

All Pioneer units.

Saxon Foot Artillery units.

All Bavarian units.

^{*} In the field, shoulder straps without piping are frequently met with. † The 1st Guard Field Artillery Regiment has also a narrow white piping inside the scarlet edging.

Yellow piping -3rd Guard Grenadier Regiment, Guard Fusilier Regiment. Infantry regiments of the V, VI, XVI and XVII Army Corps Districts, and the 112th, 118th and 142nd Infantry Regiments. 3rd Guard Field Artillery Regiment. Field Artillery regiments of the V, VI, XVI and XVII Army Corps Districts.

Blue piping-4th Foot Guards Regiment and 4th Guard Grenadier Regiment. Infantry regiments of the VII, VIII, XVIII and XX Army Corps Districts, the 40th Fusilier Regiment, and the 113th, 145th and 170th Infantry Regiments. Field Artillery regiments of the VII, VIII, XVIII and XX Army Corps Districts. Train units.

Green piping— Infantry regiments of the XXI Army Corps District, and the 114th Infantry Regiment. All Jäger battalions. Guard Schützen battalions.

108th Schützen (Fusilier) Regiment.

Field Artillery regiments of the XXI Army Corps District.

Light grey piping-Air Service, Telegraph and Communication Troops.

Prussian, Saxon and Württemberg field artillery units have a grenade, worked in red, above the number on the shoulder strap. In the case of field artillery units which wear a monogram instead of a number, the grenade is placed below the monogram.

Bavarian field artillery units do not wear a grenade on the shoulder strap.

Minenwerfer companies wear the letters "M.W." above the number of the company. Anti-aircraft troops, have a shell with yellow wings on a red shoulder strap, above the number of the unit. Anti-aircraft searchlight sections have a similar shoulder strap, but with the letter "S" instead of a number.

The following badges, worked in red above the shoulder strap number, are peculiar to

Saxon units:-

Hunting horn. Jäger and Schützen Grenade. Foot Artillery Crossed pick and shovel. Pioneers ...

The following special monograms or badges are worn on the shoulder strap by technical troops:-

Aeroplane units.. Airship and balloon units

Railway troops			(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)		E
Telegraph and telephone units	V, Teles (A)		e in e		T
*Mechanical transport troops	••		••	••	K
Experimental companies of pioneers	and cor	n m uni	ication tr	oops	To

4. Cavalry tunics.—Cuirassier, Dragoon and Jäger zu Pferde regiments wear a tunic with a stand up collar (in place of the stand and fall collar worn by the infantry), Swedish pattern cuffs and coloured piping round the lower edge of the skirt. The colour of the piping on tunic and collar varies in different regiments. The collar and cuffs are also trimmed with braid (Bortenbesatz), the pattern of which varies for different regiments.

Ulanen and Bavarian Chevaulegers regiments wear a double-breasted lancer tunic (Ulanka), with two rows of seven buttons, a pointed cuff with one button, and a stand up collar. The seams of the back and sleeves are also edged with coloured piping (see Plate 3).

The shoulder straps of the Ulanka are rounded off at the corners, except in the case of the Saxon Ulanen regiments, 17, 18 and 21, which

have shoulder straps of the normal shape.

Hussar regiments wear the braided hussar tunic (Attila), with five bars of braid on the chest, and horn acorns with loops. The Attila has coloured shoulder cords in place of shoulder straps, and braided looping on the cuffs. Metal numerals or monograms are worn on the shoulder cords.

5. Head-dress.—The black leather polished helmet, with metal spike, is worn by infantry, pioneers, train, and dragoon and Chevaulegers regiments. Artillery units wear a similar helmet with a ball instead of a spike, except in the case of Bavarian artillery units, which have a spiked helmet.

Jäger and Schützen battalions wear a black leather shako (Tschako).

Ulanen regiments wear a lancer cap (Tschapka), and hussar regiments wear a busby

Cuirassier regiments have a polished metal helmet with a spike (an eagle for Guard Cuirassiers), and Jäger zu Pferde wear a black polished metal helmet with spike.

In front of the head-dress is worn a metal plate which varies in design for the different States (see Plate 4).

In the field all the above forms of head-dress are provided with covers of field-grey cloth. The number of the unit is sometimes stencilled in green on the helmet cover.

In addition to the various forms of head-dress described above, all arms wear a soft field service cap (Feldmütze), which usually replaces the helmet in the trenches. The cap is

^{*} Tank troops wear the same uniform as mechanical transport units, i.e., shoulder straps with a red "K," but with the addition of Guard Litzen.

field-grey (grey-green) with coloured* band and welt, the colours of which vary for the different arms as follows:—

	, , . A	rm of	the ser	vice.			Cap band.	Welt.
Infantry Jäger Schützen Artillery, Train Cavalry	 eers, A	 Air Ser	vice and	d Com		oops	Scarlet Green Black with green edging Black with scarlet edging Light blue Various	Scarlet, Green. Green. Scarlet. Light blue. Various.

In the field the coloured band is concealed by a strip of field-grey cloth.

The field service cap (see Plate 6) has two coloured metal cockades in front; the upper one (Deutsche Kokarde) bears the German colours (black, white, red) in concentric rings; the lower one (Landeskokarde) bears the colours of the State. The principal State colours are as follows:—

Prussia		,	y• 1 1 • • •		• •	Black and white.
Bavaria		그 () [[[[[[[[[[[[[[[[[[[• • •			Blue and white.
Saxony						Green and white.
Württemberg	• •			• •	• •	Red and black.
Baden						Red and yellow.

These cockades are also worn at the side of the helmet, forming the chin-strap attachment.

The *Dienstmütze*, or forage cap, provided with a black leather peak and chin-strap, is worn by all ranks in peace when off parade, but in the field it is usually worn only by officers and non-commissioned officers.

6. Belt.—All arms wear a leather belt (Feldkoppel). Mounted units wear a belt with a plain buckle in front; the infantry belt has a buckle plate embossed with a crown and the national motto:—

Prussia and Baden	 " Gott mit uns."
Bavaria	 "In Treue fest."
Saxony	 "Providentiae memor."
Winttownhouse	 "Furchtlos und treu."

Attached to the belt is the bayonet frog or sword sling. The bayonet knot or sword knot varies in colour according to the company, &c.

7. Badges of rank.—Officers' uniform is of similar pattern to that of the other ranks, but is of finer material. All black facings are of velvet, and Guard patches, &c., are of silver or gold lace.

Field-grey cap-band covers were in future only to be worn with forage caps of the old pattern; no new ones were to be issued.

There was no alteration in the pattern of the peaked cap (Schirmmütze).

(6754)

^{*} German Army Order No. 699 of the 20th July, 1917, showed that a new universal pattern forage cap (*Einheits-Feldmütze*) was being introduced for all arms and ranks. This cap was to have a grey band (grey-green for *Jäger* and *Schützen*) instead of the coloured bands formerly in use.

Badges of rank are worn on the shoulder strap by officers and on the collar and cufts by other ranks. Officers' shoulder straps bear the number of their regiment in metal numerals.

Subaltern officers (a) wear narrow flat shoulder straps of silver lace.

Field officers (b) wear slightly larger shoulder straps of twisted silver cord.

General officers (c) wear shoulder straps of twisted gold and silver cord mixed, and larger than those of field officers. The tunic worn by general officers has breast pockets, and scarlet collar patches with gold embroidery.

The badges of rank for officers are-

(a) { 2nd Lieutenant (Leutnant) Lieutenant (Oberleutnant) Captain (Hauptmann or Rittmeister)	••	#(10° 00)		No star. One star. Two stars.
$(b) egin{cases} ext{Major} & (\textit{Major}) & \dots & \dots \\ ext{LieutColonel} & (\textit{Oberstleutnant}) & \dots \\ ext{Colonel} & (\textit{Oberst}) & \dots & \dots \end{cases}$			••	No star. One star. Two stars.
(c) { Major-General (Generalmajor) LieutGeneral (Generalleutnant) General (General) General-Oberst Field-Marshal (General-Feldmarschall)		• •	••	Two stars.

Non-commissioned officers wear the same uniform as the men, but are distinguished by the following badges of rank:—

Gefreiter ... A small button on each side of the collar.

Unteroffizier .. Braid round the base of the collar and one row of braid round the cuff.

Fähnrich .. Same as an Unteroffizier, but wears an officer's sword knot (Portepee).

Sergeant .. Same as an *Unteroffizier*, but has a large button on each side of the collar.

Vizefeldwebel Same as a Sergeant, but carries an officer's sword and sword knot (Portepee).

Feldwebel .. Same as a Vizefeldwebel, but has two rows of braid on the cuff and wears an officer's belt.

Offizierstellvertreter .. Same as a Vizefeldwebel, with braid round the shoulder strap and metal numerals.

Feldwebel-Leutnant .. Ranks as a commissioned officer; wears officer's uniform, but has the braid and buttons of a Feldwebel on the collar.

All Portepee ranks are entitled to wear silver cockades on the cap.

The *Portepee* is a double leather strap, about 15 inches long, hung from the sword hilt The leather is interlaced with silver wire, and at the end is a knot of silver wire also. In war, it is carried on the side arm.

8. Special badges and marks.—General Staff Officers wear carmine collar patches and a treble carmine stripe on the pantaloons.

Guard and Grenadier units wear write or yellow patches (Litzen) on collar and cuffs.

Musketry badges are worn by individual marksmen, and consist of a plaited cord (Schützenschnur) from the right shoulder to the top button of the tunic.

Machine gun marksman units are distinguished by an oval badge, representing a

machine gun, worn on the left sleeve (see Plate 7).

Electrical detachments (Starkstromabteilungen) are distinguished by a circular badge

representing forked lightning on the left sleeve.

Medical personnel and stretcher bearers wear a lemon-yellow badge representing an Asculapius' staff on the right sleeve and a Red Cross brassard on the left arm. Medical officers have dark blue collar patches edged with scarlet. Veterinary officers wear black

collar patches with carmine edging.

Certain Hanoverian, Brunswick and Nassau units, which formed part of the King's German Legion, wear British battle honours; thus the 73rd Fusilier Regiment, the 79th Infantry Regiment and the 10th Jäger Battalion wear a light blue band on the right sleeve with the inscription "Gibraltar," and all the original Hanoverian regiments have "Waterloo" inscribed on the helmet plate. The 92nd Infantry Regiment and the 17th Hussar Regiment wear a metal Death's Head badge on the head-dress.

Bandsmen and trumpeters wear epaulettes (Schwalbennester), trimmed with stripes of white or yellow braid. These stripes are vertical for dismounted and oblique for

mounted units.

Pilots, observers, and aerial gunners in the Air Service wear silver badges (Abzeichen)

on the left breast.

Units which have formed part of the Carpathian Corps (e.g., Alpine Corps, 1st Division, 200th Division) wear, above the upper cockade, a metal badge representing a stag's antlers with a sword and pine branches, with the motto "Karpathen Korps" on a scroll.

Bavarian cyclists wear green shoulder straps embroidered with the letter "R" in

yellow.

- 9. Wound decoration.—A wound decoration was introduced in March, 1918. It is an iron medal, representing a steel helmet on two crossed swords, with a laurel crown round it. The medal, which is worn on the left breast, is black for one or two wounds, dull white for three or four wounds, and dull yellow for five or more wounds. It may be worn, not only by wounded men, but by all men formerly in mobile units who have been discharged from the army in consequence of injury to their health.
- 10. Landwehr and Landsturm uniform.—Landwehr units wear the same uniform as Active and Reserve units, and are only distinguished by having a white cross on the lower cockade of the cap and the letter "L" above the number on the helmet cover.

Landsturm units wear a field-grey uniform similar to the normal one, but the shoulder straps bear no numbers and are of different colours for the various arms as follows:—

Landsturm cavalry squadrous wear the uniform of their parent regiment, and are only

distinguished by the Landwehr cross.

Landsturm units are distinguished by dull brass numerals worn on the collar. The Army Corps District is shown by a Roman numeral ("G" for Guard), and the number of the battalion, &c., by an Arabic one (see Plate 5).

Feldwebelleutnants of Landsturm units wear the numerical badges on the shoulder

straps.

Landsturm units in the field wear the helmet or shako; the helmet cover bears the number of the battalion (but not of the Army Corps District), surmounted by the Landwehr cross. Units of the Unarmed Landsturm wear an oil-cloth cap with a brass Landwehr cross in front.

11. Means of identification.—German prisoners and dead may be identified by the following means:—

(a.) Distinguishing marks on uniform and equipment.

(b.) Identity disc. (c.) Pay book.

(d.) Addressed correspondence and other documents.

(a.) The distinguishing marks denoting the various arms, grades and units have been described above. Besides these, regimental marks are frequently stencilled on the lining of the uniform, as well as the stamp of the Army Corps clothing depôt, e.g., B.A. IV., denoting the Bekleidungs-Amt of the IV Army Corps District. Owing to the frequent transfers of men from one unit to another, and also to the fact that men on leaving hospital, or returning from furlough, may be issued with uniform from another clothing depôt, such means of identification are often deceptive.

The regimental markings on arms, accourrements, gas masks, &c., are still less likely

to afford true identifications.

(b.) Identity disc.—Every German officer and soldier carries a metal identity disc (*Erkennungsmarke*), which is intended to be worn round the neck. The identity disc is not an entirely reliable means of identification, as the transfer of a man from a depôt to a field unit or from one field unit to another is not always recorded.

Three patterns of identity discs are met with (see Plate 11). The old pattern (Fig. 1), which is oval in shape, and measures 2 inches by $1\frac{1}{2}$ inches, gives the man's regiment, company and individual number in the company. The lettering is apt to be confusing, the

following abbreviations being used:-

I. or J. for Infantry.

R...... for Regiment or Reserve.

L. or Ldw. for Landwehr.

E. or Ers. for Ersatz.

C. or K. for Company.

B. or Bay. for Bavarian.

A second pattern of identity disc (Fig. 2) was introduced in September, 1915. The disc is of zinc, oval in shape, and measures $2\frac{3}{4}$ inches by 2 inches.

As soon as a man joins a depôt unit, the upper portion of his identity disc is stamped with the following particulars:—

(1.) Christian name and surname.

(2.) Last residence (in large towns, the street and number is added).

(3.) Date of birth.(4.) Depôt unit.

(5.) Company, squadron or battery (at the depôt).

(6.) Regimental number (at the depôt).

When the man is drafted to a unit in the field, the following information is added on the lower portion of the identity disc:

(1.) Unit.(2.) Company, squadron or battery.

(3.) Regimental number (in his company, &c.)

The markings of the depôt unit are not struck out.

When a man is transferred from one unit in the field to another unit, the markings of

the old unit are struck out and the new markings inserted below.

In November, 1916, a third pattern of identity disc was introduced. This pattern (Fig. 3) is similar in shape to the second pattern, but the disc is divided into two halves, upper and lower, by a perforated line. Each half bears identical markings; the name, address and depôt unit are marked on the front, and the field unit on the back. When a man is killed, the lower half of his identity disc is broken off and forwarded to Germany, the upper half being buried with the body.

(c.) The pay book (Soldbuch) forms the best means of identifying a prisoner or dead

German. The pay book is a small book $5\frac{1}{2}$ by $3\frac{1}{2}$, with a brown paper cover, marked:— "Soldbuch für den..... Nr. der Stammrolle."....

on which is written the man's name and regimental number.

The book contains the following particulars:—

	Configure the following barnemars.—
(1.)	Name in full
(2.)	Province (Prussia, Bavaria, Saxony, &c.)
.	(e) District
(3.)	Religion
(4.)	Profession or trade
	Married to
	Wife's residence District Number of children
(6.)	Date of first joining the Standing Army
`	Unit
4	Date of being called up for active service
	Unit

(7.) Medals and decorations (8.) Description Measurements of foot..... This page is usually stamped with the regimental stamp.

Then follows a statement of the daily rate of pay to which the man is entitled, and a record of the payments which have been made to him.

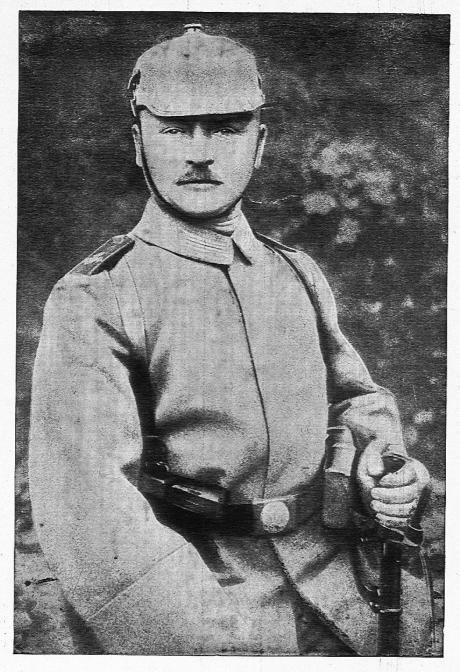
The book also records the number of times the man has been inoculated.

The private soldier in the German Army is known generally as Gemeiner and officially as Soldat or Infanterist. Technically, however, the private is designated in his pay book according to the arm or unit to which he belongs as follows:—

Schütze	= Private in a Schützen regiment or battalion, or any machine gun unit.
Jäger Gardist Grenadier	 = Private in a Jäger battalion. = " Foot Guards regiment. = " Grenadier regiment or battalion or assault battalion.
Füsilier Musketier Pionier Kanonier Fahrer	 = " " Fusilier regiment or battalion. = " " " Line infantry regiment. = Sapper. = Gunner. = Driver.

Cavalry soldiers are designated Kürassier, Dragoner, Husar, Ulan, &c., according to

The above terms only apply to "Active" soldiers. The other categories are officially designated as "Reservist," "Ersatz-Reservist," "Wehrmann," "Landsturmmann," &c.



THE NEW FIELD SERVICE JACKET.

A man of the Guard Field Artillery wearing the new field service jacket, helmet with cover but without ball, and chin strap instead of chin chain.

APPENDIX A.

THE NEW GERMAN FIELD SERVICE UNIFORM.

I.—SUMMARY OF CHANGES.

Certain changes affecting the uniforms of the German Army in peace and war have recently been published, and may be briefly summarized as follows:—

- (a.) The abolition of the old "dark blue" peace uniform (except in the case of the full dress of the Gardes du Corps, Guard Cuirassiers and certain Hussar regiments) and the substitution of a new field-grey (grey-green) uniform for all arms, for wear in time of peace.
- (b.) The introduction of a new universal pattern field service jacket (Bluse) of field-grey (grey-green) cloth for all arms and ranks, for wear on field service.
- (c.) The introduction of a field-grey greatcoat of universal pattern for all arms and ranks.
- (d.) The introduction of a field-grey peaked cap of universal pattern for all arms.
- (e.) The abolition of the special grey-green field service uniform for machine-gun batteries; all machine-gun units will wear the uniform of the unit to which they are allotted.

The regulations referred to deal only with Prussian troops, and no information is yet available concerning the changes in the uniforms of Bavarian, Saxon and Württemberg troops, though these doubtless conform in the main to the Prussian pattern.

II.—DESCRIPTION OF NEW FIELD SERVICE UNIFORM.

- (a.) Jacket (see Plate 3).—The field service jacket (Bluse) of universal pattern for all arms and ranks is shown in the Plate, and consists of a loose-fitting jacket of field-grey (grey-green) cloth, fastened down the front by hooks; turned-back cuffs of the same material as the jacket; stand and fall collar of special field-grey (grey-green) cloth used for badges (Abzeichentuch); shoulder straps of various materials and colours (see below), fastened by dull metal buttons bearing a crown; side pockets closed by similar buttons. The collar patches worn by certain regiments (Guards, Grenadiers, Fusiliers, and certain units of the Communication Troops) are shown in paragraphs II.d and III.A.
- (b.) Shoulder straps.*—There are considerable alterations to the shoulder straps of the jacket and greatcoat of the field service uniform; the particulars of the colourings of shoulder straps are summarized in the following table. It will be observed that each arm or branch of the service can at once be distinguished by the colour of the cloth of which the strap is made, except in the case of *Ulanen* and Horse and Field Artillery, for both of which it is scarlet.
 - * An Army Order, dated April, 1917, laid down that:—
 - (a.) Men belonging to light and divisional ammunition columns would in future wear scarlet shoulder straps with a grenade above the number.
 - (b.) The personnel of divisional and Corps bridging trains would wear black shoulder straps with red edging, and the number of the pioneer depôt from which the unit was formed.

Arm, &c.			Shoulder straps.					
		Cloth.		Edging.	Badge.			
Jäger and Schützen Cavalry— Cuirassiers Dragoons Hussars Lancers (7) Jäger zu Pferde	•• ••	Grey-green White Cornflower-blue Cords of the present.* Scarlet	sa	White (1) Light green (2) As at present* As at present* (4) me colours as at As at present* (8) As at present* (9)	Red (5). Golden yellow (6) or white cloth.			
Foot	version e	Golden yellow Black Light grey Cyanine-blue Crimson		Nil (11) Nil Scarlet Nil Nil Cornflower-blue	Red. Red. Red. Yellow.			

- (1.) Except 2nd Foot Guards, 2nd Grenadier Guards and 8th Grenadiers, which are scarlet; 3rd Foot Guards, 3rd Grenadier Guards, Guard Fusiliers, and 7th and 11th Grenadiers, which are lemon-yellow; 4th Foot Guards, 4th Grenadier Guards, and 145th Infantry Regiment, which are light blue; and the 141st Infantry Regiment, which is light green.
 - (2.) Except Guard Schützen Battalion, which is black.
 - (3.) Crimson for 2nd Cuirassiers.
 - (4.) Except for 22nd Dragoons, which is now black only.
- (5.) Except for 3rd Horse Grenadiers, 7th and 15th Dragoons, which are pink, and 11th and 12th Dragoons, which are crimson.
- (6.) White for 4th, 6th, 7th, 9th, 10th and 17th Hussars; remainder golden yellow. The 1st Body Hussars now wear the Imperial Monogram.
 - (7.) Ulanen now wear angular shoulder straps instead of the former special oval shape.
- (8.) Except that the scarlet edgings of the 2nd Guard Ulanen and 2nd and 6th Ulanen are abolished and the edging of the 13th Ulanen is now light blue.
- (9.) Those of the more recently formed 9th, 10th, 11th, 12th and 13th Regiments are identical with those of the 2nd, 3rd, 4th, 5th and 6th Regiments respectively, while that of the 7th Regiment is pink.
 - (10.) Except for 1st Regiment, which is lemon-yellow, and 7th, which is pink.
- (11.) Except for 1st Guard Field Artillery Regiment, which is white, 3rd Guard Field Artillery Regiment, lemon-yellow, and 4th Guard Field Artillery Regiment, light blue.
- (c.) Shoulder cords (officers').—"Field shoulder cords" will be worn by officers on the jacket (Bluse) and greatcoat; for officers below the rank of General they have a uniform width of 13 inches without any stiffening; they consist of a cloth strap of various colours, corresponding to those of the

^{*} The colours vary and are too numerous to quote here.

shoulder straps of the rank and file (in the Infantry and Jäger the colours correspond to those of the edging of the shoulder straps of the rank and file). This strap forms a foundation for the cords and badges, which are "dull" and of a size corresponding to the present size for captains.

The only exceptions to the above are as follows:-

1st Foot Guards				1	the o	cloth	strap	is e	dged	with	silver lace.
- coul D 1 0 1'		5.300	••		,,	,,	,,		"		" "
	/ <u></u>		١.		22	99	,,	,,	,,	22	
19th Dragoons .				± 2°	75	"	22	"	"	"	,, ,,
1st Flying Battalion		•••		••	"	"	"	"	"	"	white.
2nd ,, ,,			••	1843	"	"	,,	"	"	33	lemon-yellow.
3rd, ,, ,,		11	••	1.6	"	"	,,,	"	"	"	light blue.
4th	7 . 15	140		• •	"	"	"	"	"	31	Henry Draw.

(d.) Collar patches of all arms except Infantry.—The details of the collar patches of Infantry regiments and Jäger battalions have been shown for convenience in the table on pages 188 and 189; the remainder are shown in the following table:—

	Collar patches: grey.						
Unit, &c.	Shape	•	Centre.		Upper and lower stripes.		
Cavalry— Gardes du Corps Guard Cuirassiers 1st Guard Dragoons 2nd ,, Body Guard Hussars 1st Guard Ulanen 2nd ,, 3rd ,, 3rd ,, 4rtillery— 1st—4th Guard Field Artillery Regiments Guard Foot Artillery Regiment Guard Pioneers. Communication Troops All except Telegraph Battalions 2—6, Airship Battalions 3—5, and Flying Battalions 1—4 Train— 1st and 2nd Guard Train Detachments Guard Stretcher Bearers	D 11.	work of the second seco	Scarlet Cornflower-b. Scarlet " " Golden yello Black " Nil Cyanine-bluc Crimson	w	n allenda lenda		

⁽e.) Trousers and pantaloons.—No alterations to these have been published, except that officers' pantaloons must correspond in width and cut to those of the rank and file.

⁽f.) Helmets, etc.—Helmets and lance caps will be fitted with removable spikes or balls or upper portion, which will not be taken into the field. Chin straps will replace chin chains for wear with helmets,

shakos, bushies and lance caps (see Plate facing page 185).

(g.) Field service cap.—A new field service cap has been introduced for officers (details have not yet been published) and the field service cap for the rank and file will, in future, be a peaked cap of field-grey (grey-green) cloth. There are no alterations to the colours of the cap bands (see page 179), but a field-grey (grey-green) band is worn in the field to cover the coloured cap band.

(h.) Greatcoat.—A universal pattern greatcoat of field-grey cloth is being introduced for mounted and dismounted branches of all arms. The polished buttons are being replaced by dull metal buttons. The shoulder straps for Infantry and Jäger will be made of the same cloth as the greatcoat and will have the same edgings as the shoulder straps of the jacket (Bluse); for all other arms the shoulder straps are

identical with those on the jacket (Bluse).

(i.) Leather Equipment.—The following changes have been introduced:—

(a) A field service belt (Feldkoppel) of dark brown grained leather for officers instead of the old officer's waist belt (Feldbinde). Sashes will no longer be worn in the field by adjutants, who will then, like all other officers, wear the field service belt (Feldkoppel).

(b) Black laced boots and gaiters for officers.

A universal pattern of cavalry boot.

(d) Leather equipment, boots, and cases for field glasses, pistols and maps must be blacked. (There is no change in the colour of saddlery and harness.)

III.—DETAILS OF DISTINGUISHING MARKS.

A.—Infantry.

1. INFANTRY OF THE GUARD AND OF THE LINE,

Jacket (Bluse).

Cloth—Field-grey.

Collar—Stand and fall.

Shoulder straps—Field-grey, edging as shown below. Badge on shoulder strap—Red.

Buttons on shoulder straps and pockets—Dull with crown, material as shown below.

Unit.		Shoulder straps: field-grey. Edging.		. Collar I	- 124 P		
				Shape.	Centre.	Upper and lower stripes.	Buttons.
1st Foot Guards		White		Double	Scarlet	White	Nickel. Tombak.*
3rd " "		Lemon-yellow		,,	,,	,,	,,,
4th ,, ,,		Light blue		,,	,, •	,, ••	,,
5th " "		White		Old Prussian	••	,,	Nickel.
1st Guard Grenadiers	••	,,,	••	Double	Scarlet	,,,	Tombak.
2nd ", ",	••	Scarlet	••	,,	,,,	j))
3rd " "	••	Lemon-yellow	••	. ,,	,,	,,	. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
4th ,, ,,	••	Light blue	••	,, ···	,, ••	", ··	,,
5th ,, ,,	••	White	••	Old Prussian	a ::.	Yellow	7. 1 1 1 T
Guard Fusiliers	1. 0	Lemon-yellow	••	Double	Scarlet	White	Nickel. Tombak.
Grenadier Regiments, No	s. 1 to b	White	• •	Single	•• 319	Yellow	Tombak.
7th Grenadiers	••	Lemon-yellow	••	,,	-••		"
8th Body Grenadiers 11th Grenadiers	•• ••	Scarlet	••	,,	•	White	,,
0047 TL 11	•••	Lemon-yellow	••	Old Prussian		")) \ \
		White	•••	Develle	Scarlet	White	Nickel.
109th Body Grenadiers	••	T."1,	••	Double	Scariet		Tombak.
114th Infantry Regiment 145th		Light green	••				
	T	Light blue	••	••		Telegraphy	"
All other Prussian Line Regiments.	intantry	White	••		**************************************	444	"

^{*} Tombak is an alloy of zinc and copper; its colour is that of reddish brass.

2. JÄGER AND SCHÜTZEN. Jacket (Bluse).

Cloth—Grey-green. Collar-Stand and fall.

Shoulder straps—Grey-green, edging as shown.

Badge on shoulder strap-Red.

Buttons on shoulder straps and pockets-Dull with crown, tombak.

	Shoulder straps: Grey-green.	Collar p			
The state of the s	Edging.	Shape.	Centre. Upper and lowe stripes.		Buttons.
Guard Jäger Battalion Guard Schützen Battalion	Light green	Double	Light green. Black	Yellow	Tombak.
All other Prussian Jäger Battalions	Light green		••		* 33

B.—Cavalry.

Jacket .- All the special pattern tunics (Attila, Ulanka, &c.) of the cavalry have been abolished for field service, and cavalry will wear the universal pattern jacket (Bluse) of field-grey (grey-green for Jäger zu Pferde) cloth, with stand and fall collar, as described in paragraph II.a (see Plate 3).

Shoulder Straps.—These are no longer of field-grey (grey-green) cloth, but each branch of the cavalry has its own distinctive colour for the cloth of the shoulder strap, as shown in the table in

paragraph II.b. It should be noted that the shoulder straps of Ulanen Regiments are now angular instead of the former

special oval shape.

Collar Patches.—See table in paragraph II.d.

C.-Artillery.

Jacket.—Universal pattern jacket (Bluse) of field-grey cloth, with stand and fall collar, as described in paragraph II.a.

Shoulder Straps.—These are no longer of field-grey cloth, but are of scarlet cloth for horse and

field, and golden-yellow cloth for Foot Artillery, as described in the table in paragraph II.b. The badges for Foot Artillery units are altered by the addition of two crossed grenades, with the numeral of the present pattern shoulder strap beneath them.

Collar Patches.—See table in paragraph II.d.

D.—Pioneers, Communication Troops and Train.

Jacket.—Universal pattern jacket (Bluse) of field-grey cloth, with stand and fall collar, as described in paragraph II.a.

Shoulder Straps.— See table in paragraph II.b. Collar Patches.—See table in paragraph II.d.

E.—Medical and Veterinary Officers.

The changes in officers' uniforms apply also to medical and veterinary officers, whose shoulder straps, however, remain unchanged.

F.-Landsturm Formations.

The regulations lay down that the existing distinguishing badges, &c., for Landsturm formations will remain in force during the war.

These distinctions consist of shoulder straps on the tunic, jacket (Bluse), or Litewka and greatcoat, and numerals on the collar of these articles of uniform.

Shoulder Straps.—These are of different colours to distinguish the arms of the service, and bear no numeral. The colours are:—

Infantry			0.000			 Blue.
D			6		•••	 Black.
Field Artille	rv	110.15			••	 Scarlet.
Foot Artiller				100 L	٠.	 Yellow.

Numerals on Collar.—These are worn by men of the arms mentioned above on both sides of the collar of the tunic, jacket (*Bluse*), or *Litewka* and greatcoat. They are made of dull brass, and consist of the Army Corps number in Roman figures (G for Guard Corps) with the number of the battalion, &c., below in Arabic figures, the latter running consecutively from I upwards in each Army Corps, and including *Landsturm Ersatz* formations,

APPENDIX B.

CONVENTIONAL SIGNS USED IN THE GERMAN ARMY.

The following list of German conventional signs is based on captured documents and maps. Though these signs are, in most cases, known to be universal, they are not universally used, and varying forms may be met with, especially in sketch maps and manuscript documents:—

I.—GENERAL CONVENTIONAL SIGNS.

Conventional sign.	German abbreviation.	English equivalent.
V.	Ein Btl. (I Btl. L.R. 1)	Battalion (1st Bn., 1st Inf. Regt.).
II/1 (ohne 3)	II Btl. I.R. 1, ohne 3	2nd Bn., 1st Inf. Regt., less 3rd Coy.
	½ Btl	Half-battalion.
Ė	Eine Komp	Company.
(?) 45 1/Jäger 3	Radf. Komp	Cyclist Company (45th Cyclist Coy.; 1st Cyclist Coy., 3rd Jäger Bn.).
ð	Ein einzelner Div, Brig, Regts, Artillerie-, Pion	Staff of Division, Brigade, Regiment, Artillery, Pioneers.
- -	Stab. Eine M.G.K. oder M.G. (Schützen) Eskadr.	Machine Gun Company or Machine Gun Squadron (Rifles), with 9 machine guns.
T _e	Eine M.G. Esk	Machine Gun Squadron, with 6 machine guns.
т., П ₉	Eine M.G. Abtlg	Machine Gun Detachment (3rd), with 9 machine guns.
Gb.M.G.AbHg.	Eine Gebirgs-M.G. Abtlg	Mountain Machine Gun Detachment (202nd).
М.С.Яз.АЫ1.50	Eine M.G. Scharfschützen- Abtlg., zu 3 Kpn.	Machine Gun Marksman Detachment (50th) of 3 Companies.
27 UL-R 4 '	Eine Musketen-Abtlg	"Musketen" Detachment (attached to 4th Ulanen Regiment).
—		

Conventional sign.	German abbreviation.	English equivalent.
D.7 Stab.	Stab u. vier Eskadr. Drag. R. 7, mit M.G. Esk.	Staff and 4 Squadrons, 7th Dragoon Regt., with Machine Gun Squadron, with 7 machine guns.
7 3/K.6. 3 Ul.2 Stab.	3 Esk. Kür. Rgt. 6, mit M.G. Zug.	3rd Squadron, 6th Cuirassier Regt., with Machine Gun Section, with 3 machine guns.
2. Pull 2 L	Stab, 1 u-2, Esk., Ul. R. 24	Staff and 1st and 2nd Squadrons, 7th Ulanen Regiment.
4 3 P2 1	Kav. (Schtz.) Rgt	Cavalry Rifle Regiment, with Machine Gun Squadron, with 6 machine guns. 3rd Bearer Company.
3	San. Komp. 3	The Conventional angu-
30)	Scheinw. Zug. 301	301st Searchlight Section.
an (ing 33 mi de i jundi da ≸	Schwerer Sch. Zug. 33	33rd Heavy Searchlight Section.
Tegh Lind and Aged Act.	Fernspr Verbände (Armee-, Gruppen-, Div, Kav, Gebirgs-,Festungs-,Fernspr Abtl.).	Telephone Formations (Army, Group, Divisional, Cavalry, Mountain and Fortress Telephone Detachment).
	Selbständige ErdtelegrSta- tion, ausserhalb eines Fern- sprVerbandes.	Independent Power Buzzer Station (not belonging to a Telephone Formation).
(?) > ***	Selbständige A (Abhör)- Station, ausserhalb eines Fern- sprVerbandes.	Listening set (ditto).
	Selbständige Feldsignaltrupp Station, ausserhalb eines FernsprVerbandes.	Field Signal Section (ditto).
	Funkerabtl. (Armee-, Div, Kav, Geb, FestFunker- abtl.).	Wireless Detachment (Army, Divisional Cavalry, Mountain and Fortress Wire less Detachment).
erina karangan dan karangan k Karangan karangan ka	Selbst. (leichte) Funkensta- tion, ausserhalb eines Funk Verbandes.	Independent (light) Wireless Field Station (not belonging to a Wireless Formation)
The state of the s	Selbst. (schwere) Funkensta- tion (ausserhalb eines Funk Verbandes) bezw. Gruppen-	Independent (heavy) Wireless Field Station (not belonging to a Wireless Formation) or Group Wireless Station.
The state of the s	funkenstation. Funkengrossstation, bezw. Gruppenfunkenstation.	Large (high-power) Wireless Field Station or Group Wireless Station.
` g/.	Selbst. Funkenempfangstation	1 7000.
₩ ~~>	Selbst. Richtempfängertrupp.	Independent Wireless Compass Detach ment,

Conventional sign,	German abbreviation.	English equivalent.
ND 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Nachrichten-Park	Signal Park.
	Schallmesstrupp 69	69th Sound-ranging Section.
147	ArtMesstrupp 147	147th Artillery Survey Section.
() () (1) () () (1) () () () () () () () () () () () () ()	Mastfernrohrtrupp 76	76th Giant Periscope Detachment.
201 2 4 6 (oder 0 4 0)	M.W.K. 201 (Die Zahlen bedeuten schw., mittl., leichte M.W.).	
	Zeichen für Kolonnen (ausser DivKwKol.), Brücken- trains, Pferde-Laz., Dep.,	Sign for Columns (except Divisional Mechanical Transport Columns), Bridg- ing Trains, Veterinary Hospitals,
749		Depôts, &c. 749th Divisional Mechanical Transport Column.
	VermessAbtl. 4	4th Survey Detachment.

II.—ARTILLERY CONVENTIONAL SIGNS.*

(a.) Field Artillery and Trench Artillery.

	3:7 cm. Rev. K	3.7 cm. revolver gun.
	F.K. 16	(7 ·7 cm.) field gun '16.
	l.F.H. 16	(10.5 cm.) light field howitzer '16.

(b.) Foot Artillery.

1. Guns.

>	10 cm. K	10 cm. gun.
\Rightarrow	10 cm. K. 14	10 cm. gun '14.
♦ •	13 cm. K	13 cm. gun.
>→ → → → → → → → → → → → → → → → → → →	} 15 cm. K. 16	15 cm. gun '16.
> } ∥ > Kc	15 cm. K. 16 Kr	15 cm. gun '16, Krupp.

^{*} Conventional signs were also in existence for all captured guns.

2. NAVAL GUNS.

Conventional sign.	German abbreviation.	English equivalent.				
>>M	s. 10 cm. K	10 cm. naval gun.				
 ->> M	17 cm. K.i.R.L	17 cm. naval gun (on wheeled carriage).				
<u>≻</u> #⊪→	24 cm. S.K. (BettGesch.)	24 cm. naval gun (on platform mounting).				
<u> </u>	24 cm. K. (Eisenbahn-Gesch.)	24 cm. nával gun (on railway mounting).				
<u> </u>	24 cm. S.K.L/40 Eis	24 cm. Q.F. naval gun L/40 on railway mounting.				
alestration dispression case	3. HEAVY FIELD HOWIT	zers.*				
Ò-⊙→	s. F.H. 13	(15 cm.) heavy field howitzer '13.				
> →	lg. s. F.H. 13	(15 cm.) long heavy field howitzer '13.				
	4. Mortars.	RIMAN A PROPERTY				
>⊕ →	lg. Mrs	Long (21 cm.) mortar.				
-00	28 cm. H.i.R.L	28 cm. howitzer on wheeled carriage.				
>⊕⊕>	Kz. Mar. Kan. 14 (42 cm.) (M.in Räderlafette fahrbar)					
	(c.) Anti-aircraft Guns.					
<u>□</u> =	K. Flak. von 8.8 cm., 8 cm., 7.7 cm. oder 7.62 cm. Kaliber. 10.5 cm. Flak.	AA. gun, 8.8 cm., 8 cm., 7.7 cm. or 7.62 cm. calibre, on motor lorry. 10.5 cm. AA. gun.				

(d.) Method of showing Batteries.

(a.) Unit and nature of gun.—In most cases, the battery and regimental or battalion numbers are merely written against the conventional sign of the gun with which the battery is armed.

Examples (from captured maps).

5/600 > ====================================	Feld Art. Regt. 600, 5. Battr. Fuss. Art. Bn. 774	774th Foot Art. Bn. (15 cm. heavy field
$\rightarrow \rightarrow$		howitzer '13.)

^{*} In this type of conventional sign, the dot in the centre of the circle is sometimes replaced by a short line at right angles to the arrow.

(b.) Unit and nature and number of guns.—An official document, giving a list of conventional signs, states that the numbers above the conventional sign denote the regiment, battalion, Abteilung or battery, while the number below the conventional sign denotes the number of guns.

Examples (from a captured document).

Conventional sign.	German abbreviation.	English equivalent.
5.R.IB	Res. Fuss. Art. Regt. 18, 5. Battr.	5th Batty., 18th Res. Foot Art. Regt. (3 mortars, 21 cm.).

(c.) The type of battery (horse, field, &c.) is shown on the above-mentioned document, below the conventional sign.

Examples (from a captured document).

14 fahrende	F.K. Battr	Field Artillery Battery, 4 guns. (7.7 cm 96 n/A. pattern.)
fahrende	l. F.H. Battr	Field Artillery Howitzer Battery, (4 howitzers, '98/'09 pattern.)

(d.) Anti-aircraft gun units.—The various types of A.-A. guns are distinguished by the prefixes E, K, M, O or W, before the battery or section number.

 $E = auf \ Eisenbahnwagen = on \ railway mounting.$ $K = auf \ Kraftwagen = on \ motor \ lorry.$

M = Maschinen-Kanone = automatic gun.

O = Ortsfeste = on fixed mounting. W = auf Wagen = on wagon, or horse-drawn.

Where necessary, the calibre is added in brackets after the section number.

III.—AIR FORCE CONVENTIONAL SIGNS.

75	Fl. A. 75	75th Reconnaissance Flight.
2[9(A)	Fl. A. 219 (Artl.)	219th "A" Flight.
	Armee-Flugpark 8	8th Army Aircraft Park.
15	Ballonzug 15	15th Balloon Section.
Y	Belegter Flughafen	Occupied aerodrome.
$\triangleright \infty$	Unbelegter Flughafen	Unoccupied aerodrome.
→	Gefechtslandeplatz	Advanced landing ground.
	Ballonaufstiegstelle	Balloon bed.
(6754)	The est among the second of th	n de la company de la comp La company de la company d

IV.—CONVENTIONAL SIGNS ON MAPS.

Conventional sign.	German abbreviation.	English equivalent.
	Kampfgraben*	Fire trench.*
~~~	Verbindungsgraben	Communication trench.
	Aufgesetzter Kampfgraben u. Hauptverbindungsgraben.	Fire trench and main communication trench (breastwork).
1 pt	Verdrahteter Graben	Wired trench.
***********	Zerfallener Graben	Trench which has fallen in.
***	Offener Kabelgraben†	Open cable trench.†
K-4-18-0	Geschlossener Kabelgraben	Buried cable route.
<b>E</b> ======	Stollen	Deep dug-out.
	Im Bau befindliche Stellung	Position in course of construction.
	Geplante Stellung	Intended position.
	Stellung n. Truppenmeldung  Kampfzone	Position according to reports from the troops.  Battle zone.
	Sprengtrichter	Mine crater.
000000	Trichterstellung, Schützen- löcher.	Crater-position, rifle pits.
00000	Postenlinie	Line of posts.
	Einzelposten	Single post.
**************************************	Drahthindernis (jede Reihe entspricht etwa 10 m. Breite).	Wire entanglement (each belt is about 11 yards in depth).
-X-X-X-X	Spanische Reiter	Knife-rests.
ellelle	Schnelldrahthindernis	Portable wire entanglement.
YYYYYYY	Astverhau	Abatis.
++++++	Strassensperre	Barricade.

* In another document drainage trenches are shown as:



† In another document, overland cable is shown as:

State of the second sec		
Conventional sign.	German abbreviation.	English equivalent.
XKVYXKVYX	Hindernis, elektrisch geladen	Live wire entanglement.
thath	Drahtzaun	Wire fence.
-\-\-\-\-\-\-	Maske	Screen.
in a successive for	M.G	Machine gun.
1 n 1 n 2	M.GStand ausgebaut	Machine-gun emplacement (completed).
	ausgebaute Batteriestellung	Battery position (completed).
<b>/</b>	erkundete BattrStellung	Battery position (reconnoitred).
in the second second	Flak	Anti-aircraft gun.
<b>~</b> ·	Kampfpanzerturm	Armoured turret.
	Minenwerferstand n. Flieger- bild. M-WSt. nach Fliegerbild festgestellt u. wiederholt feuernd erkannt.	Trench mortar emplacement (from aero- plane photograph).  Trench mortar emplacement (located by aeroplane photographs and re- peatedly observed to be in action).
3.4	(Allgemeine Zeichen für) Befehlsstellen v. Gefechts- stände, schusssicher, nicht schusseicher. RegtsGefechtsstand	General signs for command posts and battle headquarters, shell-proof and not shell-proof.  Regimental battle headquarters.
<b>)</b>	DivGefechtsstand	Divisional battle headquarters.
	Abt. od. Btl. (Untergruppe)	Abteilung or battalion (sub-group) head-quarters.
Y	Butterie BeobSt	Battery observation post.
	Schusssicher	Shell-proof.
	Nicht schusssicher	Not shell-proof. Dugouts.
	Allgemein	General sign.
A. Wald, Divor	Artillerie	Artillery. Ammunition dumps.
and many ( Congress)	Fernsprechstelle	Telephone station.

Conventional sign.	German abbreviation.	English equivalent.
O Mariana	Funkstelle ,.	Wireless station.
R	Blinkstelle	Lamp signal station.
E	Erdtel-Stelle	Power buzzer station.
	Brieftaubenschlag	Carrier pigeon loft.
A	Arendtstelle	Arendt listening set post.
	Scheinwerfer	Searchlight.
	Sanitäts-Unterst., schusssicher	Medical dug-out (shell-proof).
	Truppenverbandplatz	Regimental aid post.
太	Wogenhalteplatz	Halting place for ambulance vehicles
	Unbelegt	Unoccupied.
	Belegt	Occupied.
	Baracken-Lager	Huts. , Camps.
	Unterstands-Lager	Dug-outs.
	Zelt-Lager	. Tents.
	Anmarschweg	. Approach road.
#####	Knüppeldamm	. Corduroy road.
事等等意為	Knüppelsteg	. Duck-boards.
要 多	Brücke u. Strasse gesprengt .	Bridge and road blown up.
AF DE	Zur Sprenguny vorbereitet .	. Bridge and road prepared for demol

Conventional sign.	German abbreviation.	English equivalent.
	Oberkommando einer Heeres- gruppe.	H.Q. of a Group of Armies.
	Armeeoberkommando	Army H.Q.
	Generalkommando	Corps H.Q.
	. Divisionskommando	Divisional H.Q.
	Brigadekommando	Brigade H.Q.
	Regimentsstab	Regimental H.Q.
1/108	BatlStab (I. Btl., J.R. 108)	Battalion H.Q. (1st Bn., 108th Inf. Regt.)

APITION CONTRACTOR OF THE PROPERTY OF THE PROP

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# Titular Monograms on the Shoulder Straps of certain German Infantry Regiments.

# GUARD GRENADIER REGIMENTS.









### GRENADIER REGIMENTS.











INFANTRY REGIMENTS.























Inf. Rgt. 88































Inf.-Rgt. 104

Inf.-Rgt. 106

Leib.-Gren.-Rgt. Gren.-Rgt. 110





Inf. Rgt. 114 Leib-Garde Inf.-Rgt. 115



Inf.-Rgt. 116 Inf.-Leib-Rgt. 117 Gren.-Rgt. 119





Inf.-Rgt. 120



Gren. Rgt. 123 Inf.- Rgt. 124



Inf.-Rgt. 125



BAVARIAN INFANTRY REGIMENTS.



Bayer. Inf.-Leib-Rgt.







3. Bayer, Rgt.

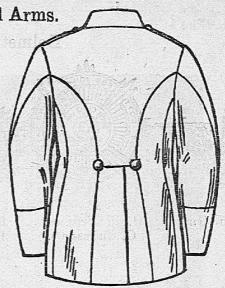




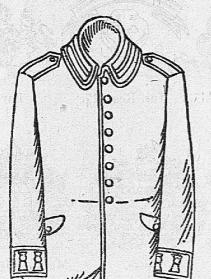




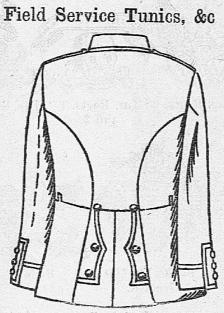
Front View.



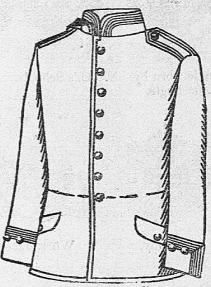
Back View.



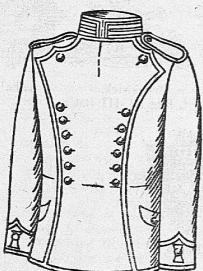
Front View.
(4th Gd. Reiter Rgt.)
Tunic with turned down collar.



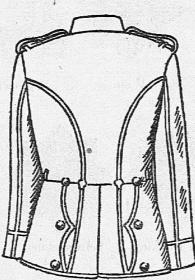
Back View. (Inf. Regt.)



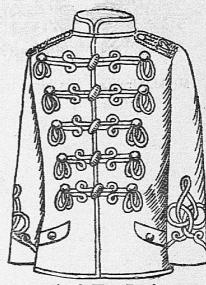
Tunic with stand up collar (8th Cuir, Regt.)



Front View. (2nd Gd. Ulanen Rgt.)



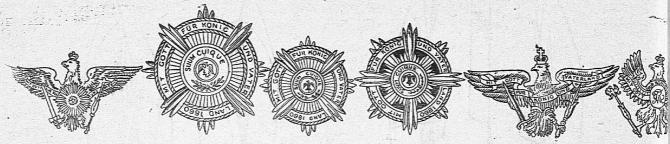
Back View. (15th Ulanen Rgt.)



(12th Hus. Rgt.)

(6754)

# Helmet and Shako Onnaments.



Troops of the Guard.

G. du Corps and G. Cuirassiers.

Body Gd. Hussars.

G. Jäger, Train and Schützen.

Gren. R. 2, 7, 8. Drag. No. I. Horse Gren. R. No. 3. (Silver.)

Eagle



Line Regts.

Eagle worn by N.C.O.'s Schools.



Drag. Regts.



Hus. Regt. 17. Hus. Regt. 7.

Bavaria



Saxony.



Württemberg.



Baden No. 109 Gren, R.



Baden.



Hesse.



Meckl.-Schwer



Meckl. Strelitz.



Oldenburg.



Saxe Weimar.



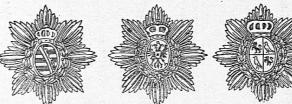
Brunswick.



Brunswick. Inf. Reg. 92, III Battn.



Anhalt.



Saxon Duchies Schwarzburg.



Reuss.





# Infantry Private in Marching Order.

The man belongs to the 239th Res. Infantry Regt., as shown by the number on helmet cover and shoulder strap. The shoulder strap has a coloured strip as a further distinguishing mark; this is peculiar to some divisions and is not regulation.

The cuff is of the new turned back pattern instead of the older Brandenburg type.

The photograph shows the normal way of carrying the pack, greatcoat, ammunition pouches and entrenching tool, but the man is not carrying the tent-square which is normally strapped above the greatcoat.



# Landsturm Infantry Private in Marching Order.

The man belongs to Landsturm Infantry Battalion XI/22, as shown by the copper numerals on his collar. The helmet cover also bears the number 22, and the Landsturm cross. The rifle and bayonet are of an old pattern, but otherwise the equipment is the same as that of infantry of the line.



# Infantry Uniform.

A private of the 28th Inf. Regt. or 28th Res. Inf. Regt., as shown by the number on the shoulder strap. The tunic buttons are embossed with the Prussian crown; the shoulder strap button, which bears the number 1, shows that the wearer belongs to the 1st company of his regiment.

The red band of the forage cap is concealed by a strip of grey cloth. The upper cockade is the imperial one, black, white and red; the lower cockade is black and white, the Prussian colours,



### Infantry Uniform.

A Vizefeldwebel belonging to the grenadier battalion of the 109th Res. Inf. Regt. On the collar he wears grenadier braid patches (Litzen), as well as the lace and button which are the rank badges of a Feldwebel or Vizefeldwebel.

The forage cap is of the peaked type hitherto worn only by officers and non-commissioned officers. The red band is covered by a grey strip. The upper cockade on the cap is the imperial one, black, white and red. The lower cockade is red and yellow, the Baden colours.

The non-commissioned officer is wearing the ribbon of the Iron Cross, 2nd Class,





# Machine Gun Unit.

A gun crew belonging to a machine gun marksman company (M.G. Scharf-schützen-Kompagnie). All the men wear the machine gun marksman's badge on

The gun commander, on the right, is an Unteroffizier, as he has lace on his collar and wears a peaked cap. The second man from the right is a lance-corporal (Gefreiter), and wears a button on each side of the collar.

The State (lower) cockade on the forage-cap is hidden in each case by the grey

cap band cover.

The man on the left is wearing turn over cuffs of the new pattern. The machine gun is of the ordinary '08 pattern with telescopic sight.

The cross-belts, which are peculiar to machine gunners, are worn in action by the detachments; they serve to carry the equipment.



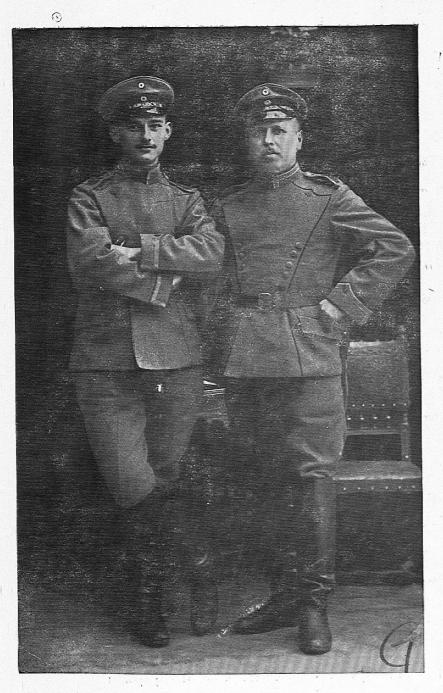
# Field Artillery.

The man on the right is a gunner, and the man on the left is a driver of the field artillery. The helmet has a ball instead of a spike. The gunner is armed with a rifle* and bayonet, and wears the infantry belt.

The driver is armed with sword and revolver and wears a belt of the cavalry pattern.

^{*} Gunners are normally armed with the carbine.





Cavalry.

Two corporals (Unteroffiziere) of the 20th Ulanen Regiment, as seen by the regimental monogram on the shoulder strap; they wear the double-breasted lancer tunic with pointed cuffs.

The rank is denoted by the lace on collar and cuffs.

The lower cockade of the forage cap bears the Württemberg colours, red and black.



# Pioneer in Marching Order.

The man belongs to a field company of the 14th Pioneer Battalion, as shown by the number on helmet cover and shoulder strap.

The cuff is of the Swedish pattern, instead of the Brandenburg cuff worn by

the infantry.

The pouches differ from those of the infantry, and the bayonet has a saw-back.

A long-handled spade is carried in place of the short infantry entrenching tool.

The tent-square can be seen strapped above the greatcoat and pack.



# Pioneers.

A group of pioneers belonging to a field company of the 8th Pioneer Battalion, as shown by the black cap band and number on the shoulder strap.

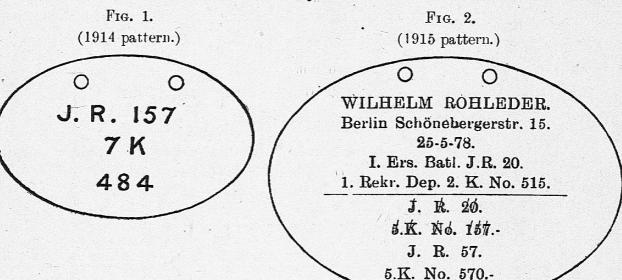
The man on the extreme left is a lance-corporal (Gefreiter) as shown by the button on

The left-hand man in each row is wearing the new field service jacket (*Bluse*) with turn-over cuffs, black shoulder straps, and fastened with hooks and eyes instead of buttons. There is a black piping down the seam of the trousers.

The men are seated in one of the steel half-pontoons which form part of the equipment of a Divisional bridging train.



# Identity Discs.



Wilhelm Rohleder
BERLIN, SCHÖNEBERGERSTR. IS

1. ERS. BATL. J.R., 20
I.REKR. DEP. 2.K.NR., 515

Wilhelm Rohleder
BERLIN, SCHÖNEBERGERSTR. IS

25.5.78.

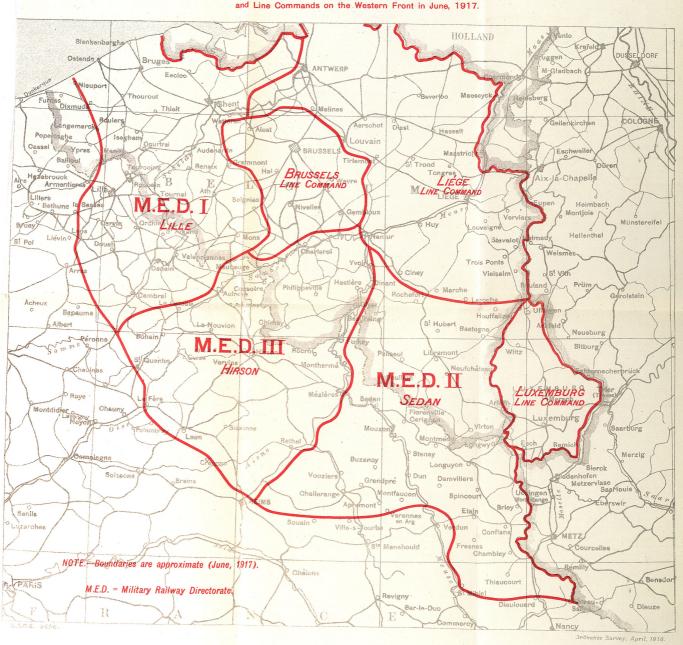
1. ERS. BATL. J.R. 20
I.REKR. DEP. 2.K. NR. 570

Front. Back,

Back,

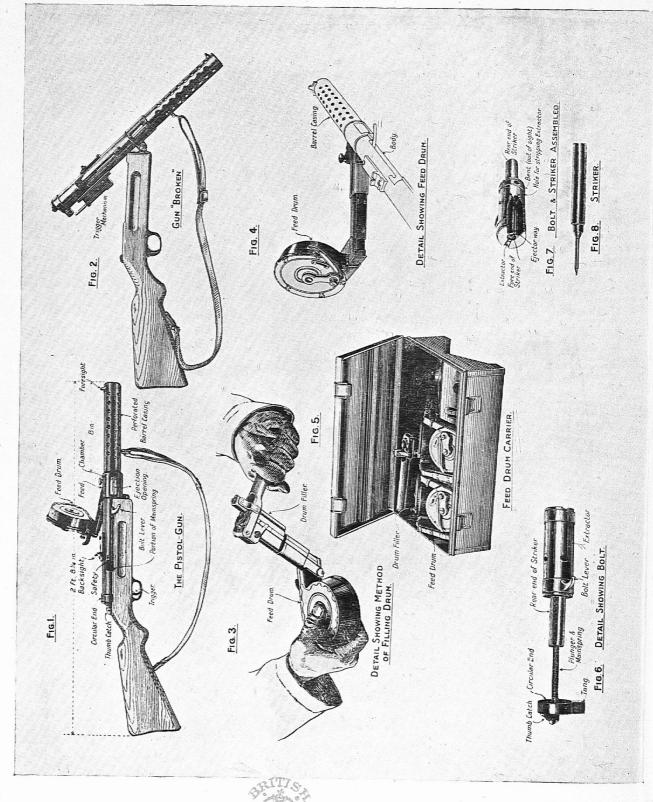
Plate 12.

MAP SHOWING Zones of Administration of the Military Railway Directorates and Line Commands on the Western Front in June, 1917.

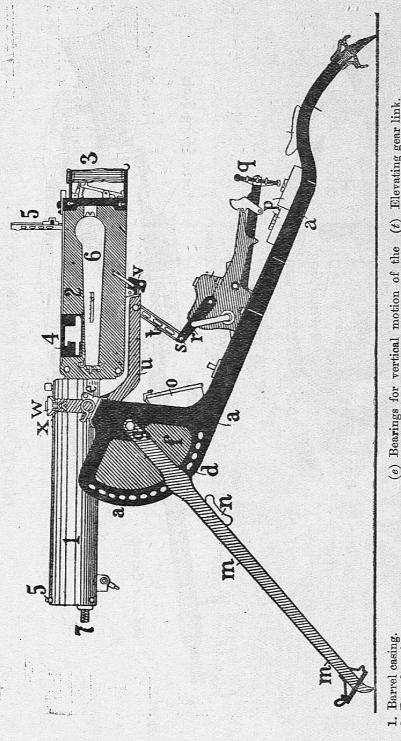


A. The '98 Pattern Rifle, B. The 13-mm. Anti-Tank Rifle.

1918 Pattern Automatic Pistol-Gun (Masshinen-Pistole 18.1.)







(e) Bearings for vertical motion of the

(m) Front legs.
(n) Pad resting on gunner's shoulder when mounting is carried by one

(o) Box for spare lock.
(p) Box for lubricants and small spares.

(q) Elevating gear handle and quick

(a) Sledge runner when front legs fare folded back.

Tangent sight, raised.

6. Fuzee spring box, 7. End of barrel.

Traversing handles.

Feed block.

Breech casing.

release catch. (d) Securing catch for adjusting the height of front legs working in the slots cut in the curved plate.

(t) Elevating gear link.(w) Curved arm for elevating or depress-

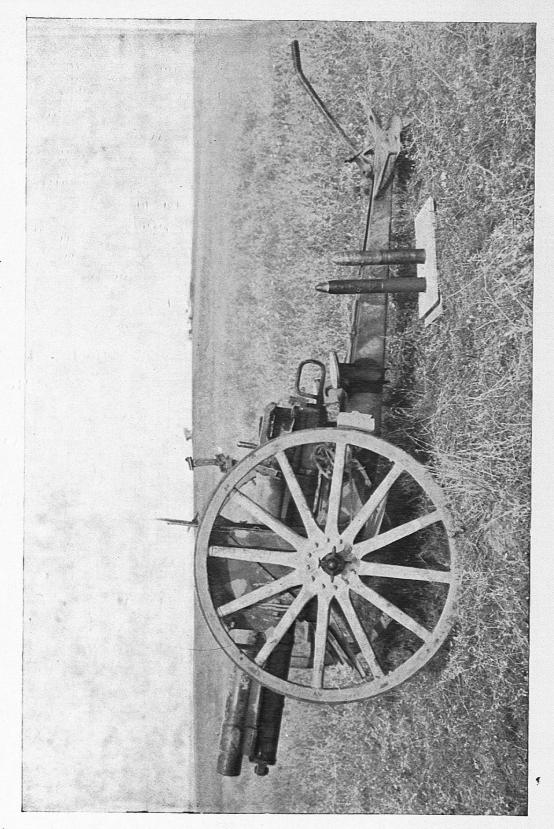
(v) Traversing jambing handle.
(w) Transing fambing handle.
casing, allowing borizontal motion of the gun.
(x) Wing nut, securing the gun in the

mounting.

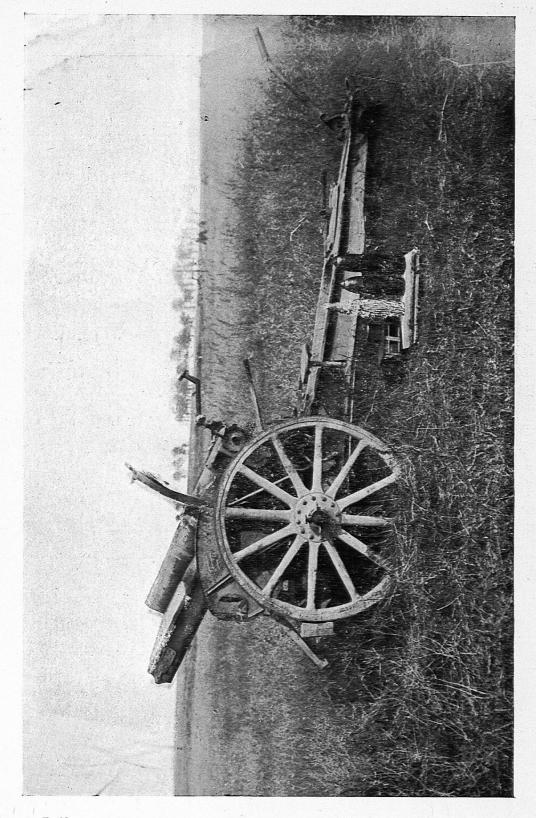
(r) Jambing handle for elevating gear.
(s) Hinged joint.

Fuzee Spring Box Fuzee Spring Scale. -Tangent Sight. Fitting for attaching Condenser Tube German Light Machine Guns ('08/'15 and '08/'18). Bipod Clamp. Pistol Grip Sling. '08/'15 pattern. '08/'18 pattern. Feed Block Mand Grip -Foresight Standard. Barrel Casing. Foresight Radiator Casing. Ball firing attachment. Ball firing attachment





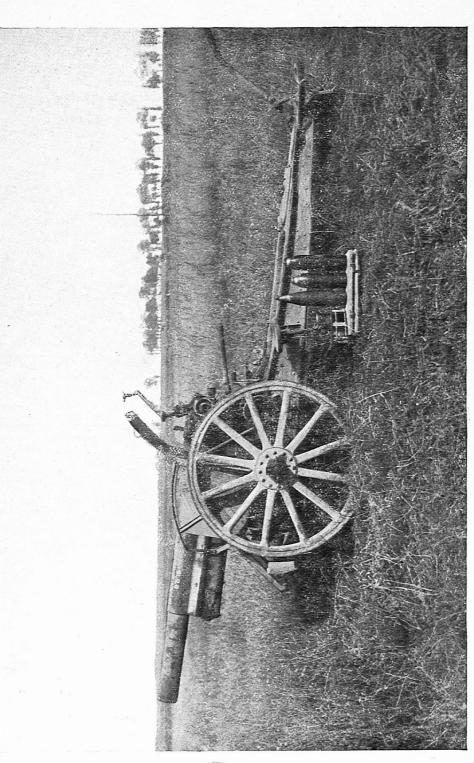
1896 n/A. Pattern Field Gun ("F.K. 96 n/A.").



'98/'09 Light Field Howitzer ("I. F.H. 98/09").

w.n.c

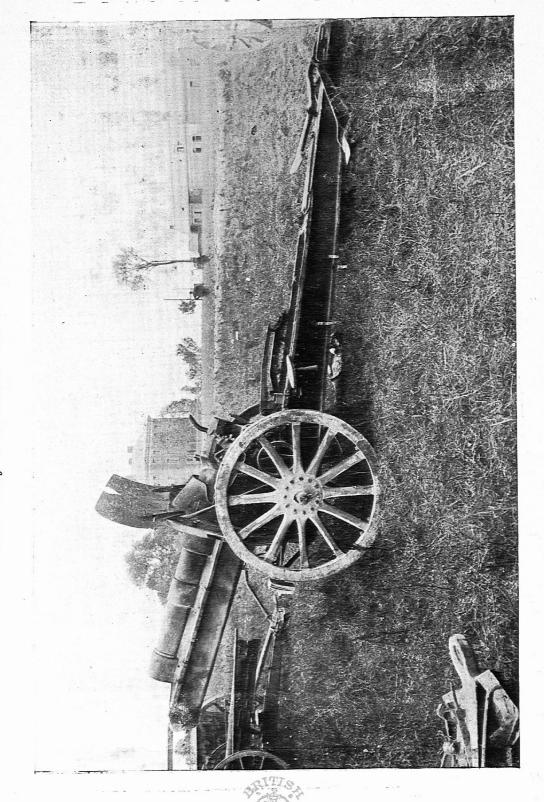




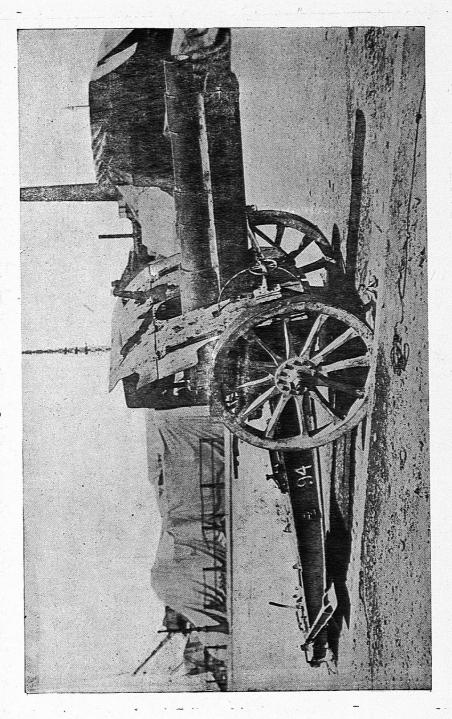




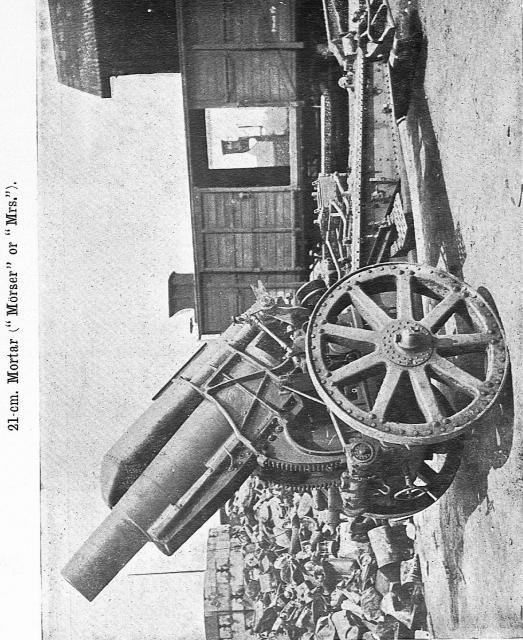
15-cm. Heavy Field Howitzer '02 ("s. F.H. 02").



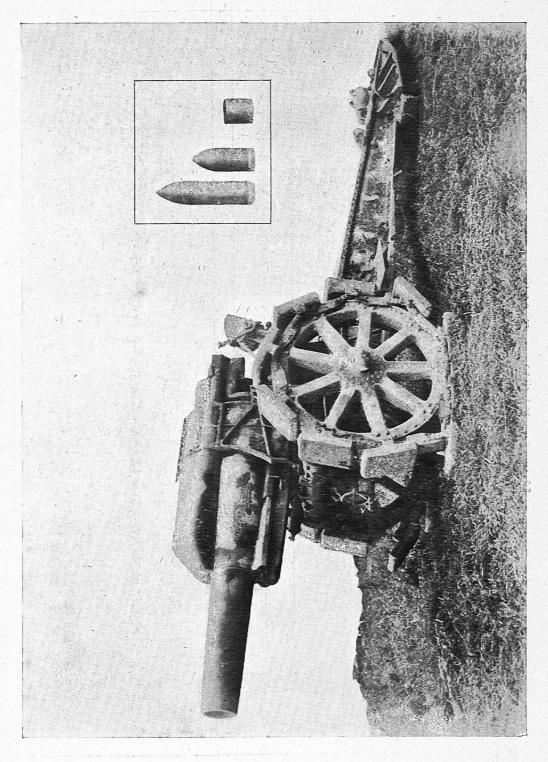
15-cm. Heavy Field Howitzer '13 ("s. F.H. 13").



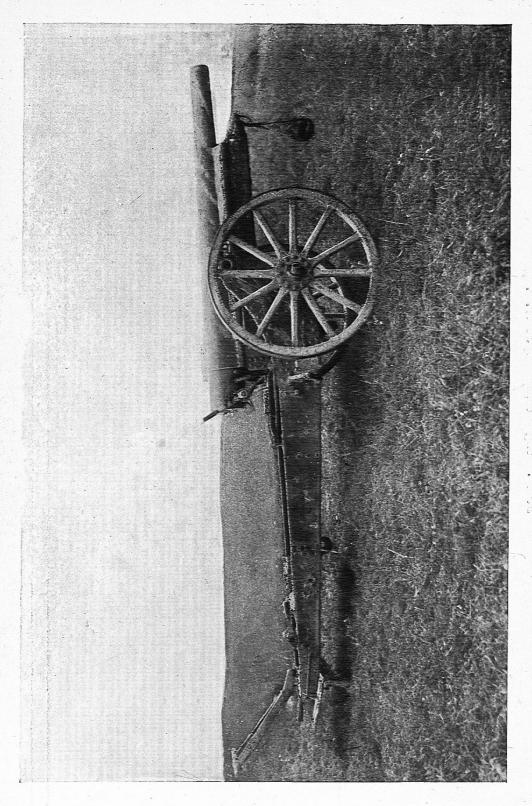
15-cm. Long Heavy Field Howitzer '13.





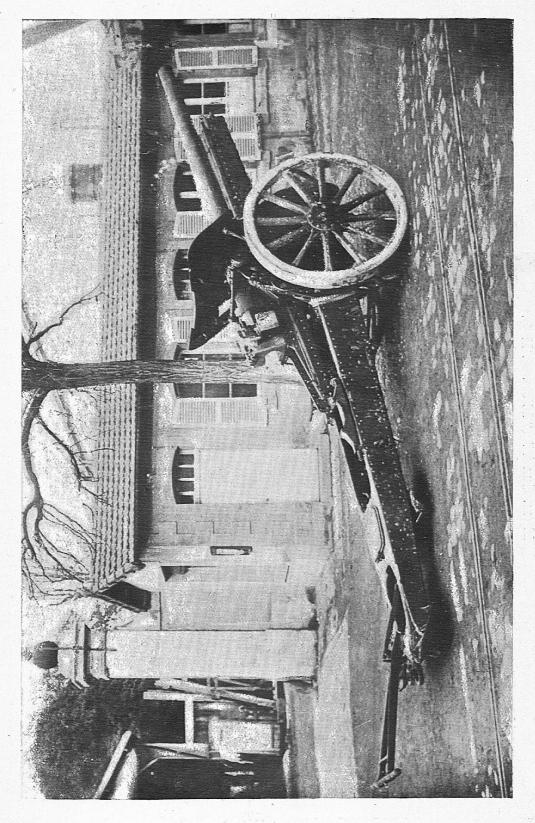


21-cm. Long Mortar ("lg. Mrs.").

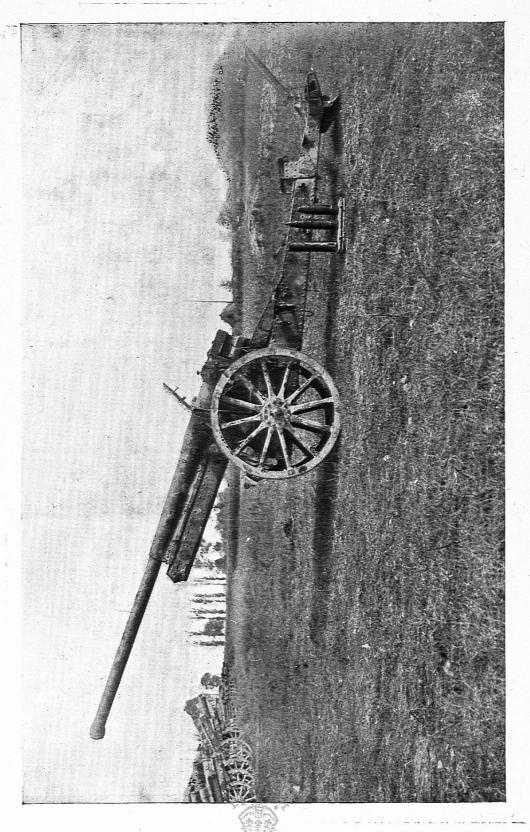


10-cm, Gun '04 ("10-cm, K, 04"),

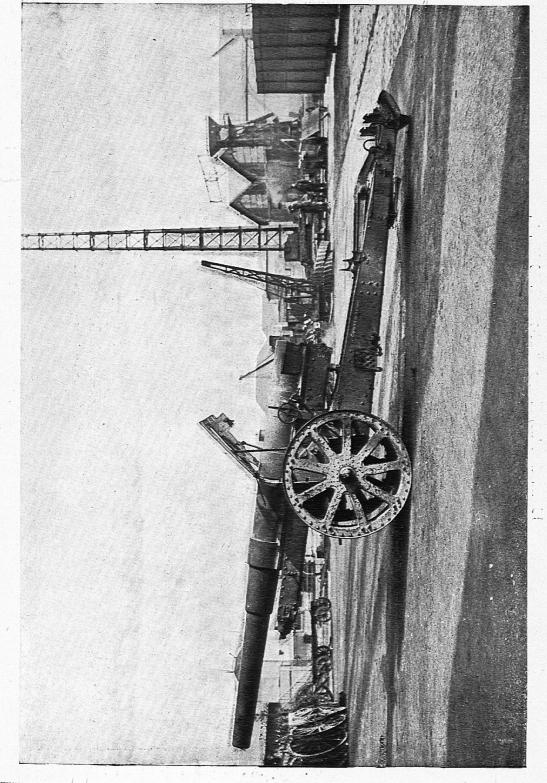




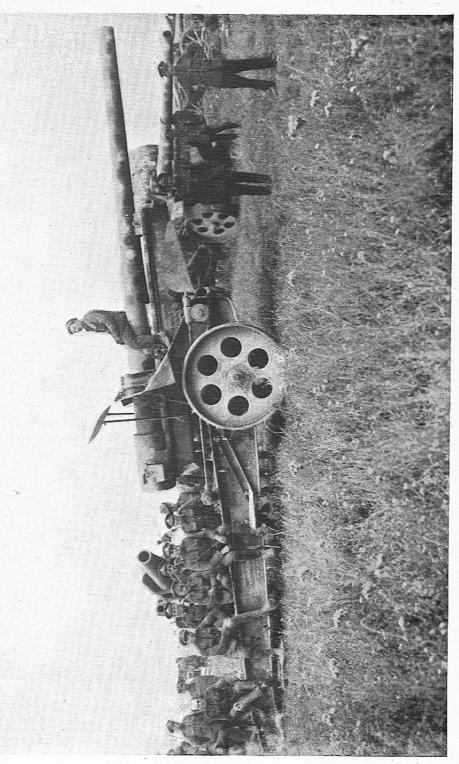
10-cm. Gun '14 ("10-cm. K. 14").



10-cm. Gun '17 ("10-cm. K. 17").

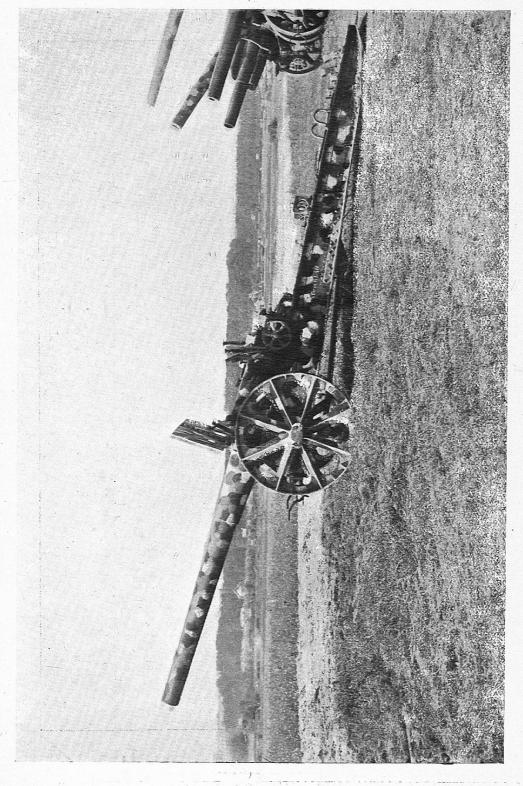


13-cm. Gun ("13-cm. K.").



15-cm. Gun '16, Krupp ("15-cm. K. 16 Kp.").





15-cm. Naval Q.F. Gun L/40 ("15-cm. S.K. L/40").

PLATE 32.

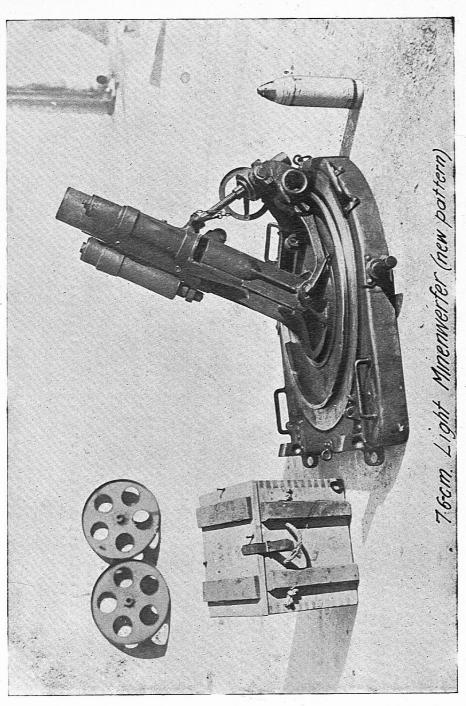
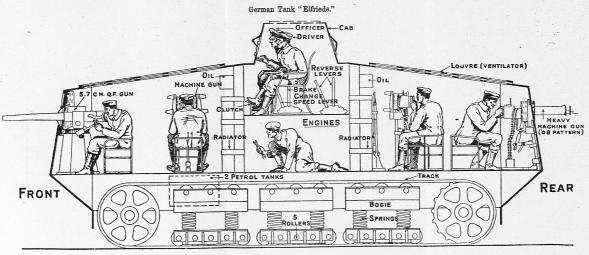




PLATE 33.

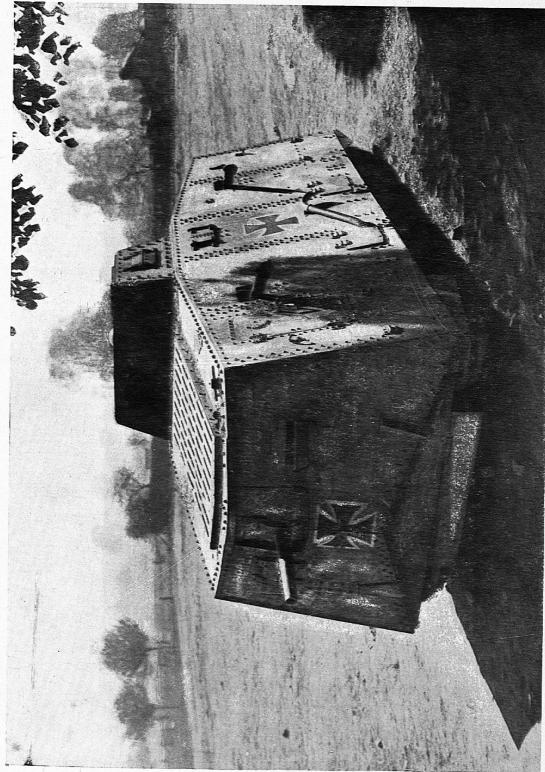


Scale of Feet

View of interior of Tank.

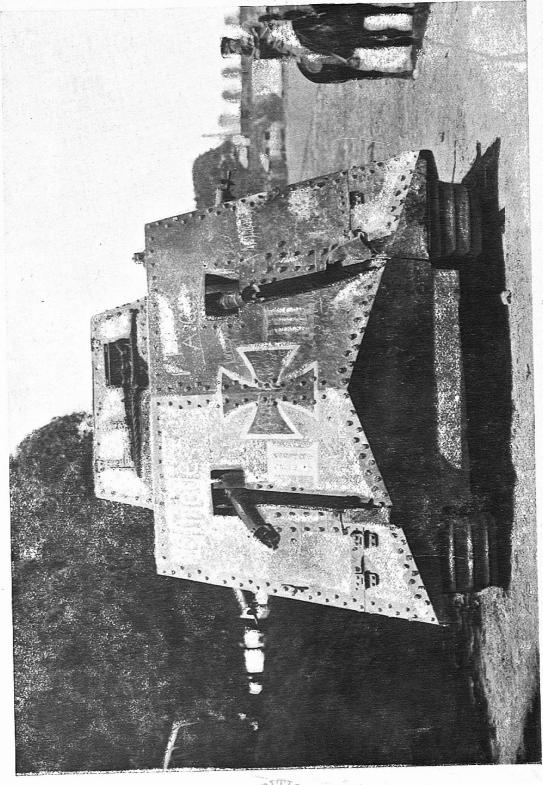


The Tank is seen approaching.



German Tank "Elfilede."

German Tank "Elfriede."





## CHART SHOWING THE NUMBER OF MEN IN GERMANY AVAILABLE FOR MILITARY SERVICE, 1914 TO 1918; THE NUMBER CALLED UP AND HOW DISTRIBUTED.

